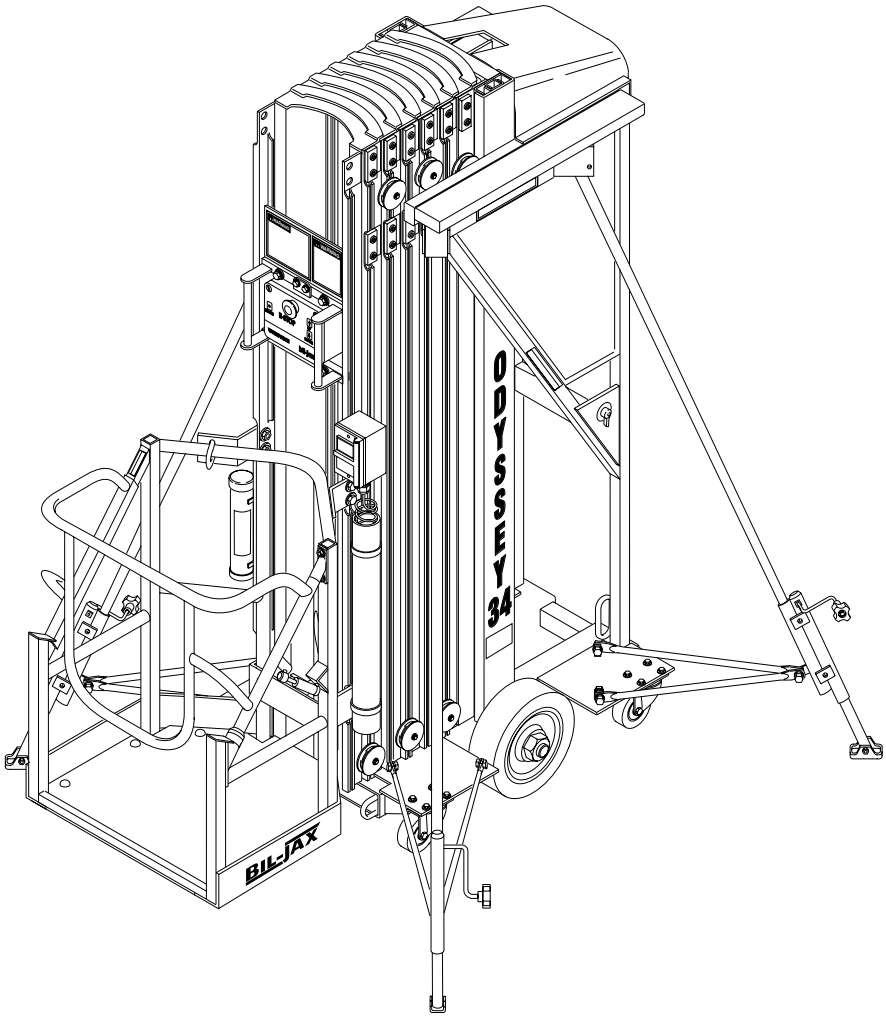
BIL-JAX
a step above ®
AERIAL WORK PLATFORMS

Operation and
Maintenance Manual

ODYSSEY 34

Electric Hydraulic Lift Platform



B33-01-0071

TELESCOPIC PERSONNEL LIFT

This equipment is designed and manufactured in compliance with the duties, responsibilities, and standards set forth for manufacturers in the ANSI 92.3 standard in effect at the time of manufacture.

This equipment will meet or exceed applicable OSHA codes and ANSI A92.3 standards when used in accordance with sections 5, 6, 7, 8, 9 & 10 of ANSI A92.3 and all other manufacturer's recommendations.

It is the responsibility of the user of this equipment to follow all applicable ANSI, OSHA, Federal, State, and local codes and regulations that govern the safe operation of this equipment.

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Safety

1-1 INTRODUCTION

Familiarity and proper training are required for the safe operation of mechanical equipment. Equipment operated improperly or by untrained personnel can be dangerous. Read the operating instructions in this manual and become familiar with the location and proper use of all controls. Inexperienced operators should receive instruction from someone familiar with the equipment before being allowed to operate the machine. The use of intelligence and common sense in the operation of mechanical equipment is the best practice in any safety policy. Be professional and always observe the safety procedures set forth in this manual.

All OSHA, ANSI, state and local codes and regulations pertaining to this equipment should be obtained, read, and thoroughly understood before attempting to operate this equipment. Persons under the influence of drugs, alcohol, or prescription medication should not be on or near this equipment. Common sense should be implemented at all times during the use of this equipment. Do not operate this equipment in areas where equipment or user may come in contact with live power source.

The information contained herein is not to be considered as legal advice and is intended for informational purposes only. This information is offered to alert Bil-Jax customers to procedures that may be of concern to them.

This information is not intended to be all inclusive and is to be followed in the use of Bil-Jax equipment only.

For any questions concerning the safe use of this equipment, call 419.445.9675 before operating.

Safety Notes

This manual contains DANGERS, WARNINGS, CAUTIONS, and NOTES that must be followed to prevent the possibility of improper service, damage to the equipment, or personal injury.

DANGER

Dangers warn of equipment operation near electrical power lines that could lead to personal injury or death.

WARNING

Warnings describe conditions or practices that could lead to personal injury or death.

CAUTION

Cautions provide information important to prevent errors that could damage machine or components.

NOTE: Notes contain additional information important to a procedure.

1-2 BEFORE OPERATION

Ensure the following general safety precautions are followed before operating the Odyssey 34 lift.

- ALWAYS survey the usage area for potential hazards such as untampered earth fills, unlevel surfaces, overhead obstructions, and electrically charged conductors or wires. Be aware of any potential hazards and always consider what could happen. Watch for moving vehicles in the operating area.
- ALWAYS read, understand, and follow the procedures in this manual before attempting to operate equipment.
- ALWAYS inspect the equipment for damaged or worn parts. Check for cracked welds, hydraulic leaks, damaged wiring, loose wire connectors, damaged casters, and damaged outriggers. Also check for any improper operation. NEVER operate equipment if damaged in any way. Improperly operating equipment must be repaired before using.
- ALWAYS wear proper clothing for the job. Wear protective equipment as required by federal, state, or local regulations.
- ALWAYS locate, read, and follow all directions and warnings displayed on the equipment.
- ALWAYS inspect the equipment for any “DO NOT USE” tags placed on the equipment by maintenance personnel. NEVER use any equipment tagged in this way until repairs are made and all tags are removed by authorized maintenance personnel.
- ALWAYS make sure the cage platform and outrigger shoes are free of mud, grease, or other foreign material. This will reduce the possibility of slipping.
- NEVER allow improperly trained personnel to operate this equipment. Only trained and authorized personnel shall be allowed to operate this equipment.
- NEVER operate this equipment if you are under the influence of alcohol or drugs or if you feel ill, dizzy, or unsteady in any way. Operators must be physically fit, thoroughly trained, and not easily excitable.
- NEVER modify, alter, or change the equipment in any way that would affect its original design or operation in any way.
- NEVER operate this equipment in ways for which it is not intended.

1-3 DURING OPERATION

Ensure the following general safety precautions are followed during the operation of the Odyssey 34 lift.

⚠ DANGER

This machine is not insulated for use near electrical power lines and DOES NOT provide protection from contact with or close proximity to any electrically charged conductor. Operator must maintain safe clearances at all times (10 feet minimum) and always allow for platform movement such as wind induced sway. Always contact the power company before performing work near power lines. Assume every line is hot. Remember, power lines can be blown by the wind.

Refer to Table 1-1 for minimum safe approach distances between machine and electrical power lines.

Table 1-1. Minimum Safe Approach Distances

Voltage Range (Phase to Phase)	Minimum Safe Approach Distance	
	(Feet)	(Meters)
0 to 300V	Avoid Contact	
Over 300V to 50KV	10	3.05
Over 50KV to 200KV	15	4.60
Over 200KV to 350KV	20	6.10
Over 350KV to 500KV	25	7.62
Over 500KV to 750KV	35	10.67
Over 750KV to 1000KV	45	13.72

- ALWAYS position lift far enough away from power sources to ensure that no part of the lift can accidentally reach into an unsafe area.
- ALWAYS operate only on a firm and level surface. NEVER use on surfaces that do not support the weight of the equipment and its rated load capacity.
- ALWAYS keep yourself and all personnel away from potential pinch or shear points.
- ALWAYS report any misuse of equipment to the proper authorities. Horseplay is prohibited.
- ALWAYS maintain good footing on the cage platform. NEVER wear slippery soled shoes.
- ALWAYS make certain all personnel are clear and there are no obstructions before repositioning cage platform.
- ALWAYS cordon off area around the outriggers to keep personnel and other equipment away from it while in use.
- ALWAYS stay clear of wires, cables, and other overhead obstructions.
- ALWAYS disconnect power at the batteries when not in use to guard against unauthorized use.

- NEVER allow electrode contact with any part of the cage platform if welding is being performed by a worker from the cage platform.
- NEVER use without the outriggers fully based on the floor.
- NEVER override or by-pass manufacturer's safety devices.
- NEVER release outrigger locks or move unit with a person or materials on board.
- NEVER stand or sit on cage bars. Work only within the cage platform area and do not lean out over cage platform to perform work.
- NEVER attempt to increase working height with boxes, ladders, or other means.
- NEVER operate this equipment when exposed to high winds, thunderstorms, ice, or any other weather conditions that would compromise the safety of the operator.
- NEVER climb up or down masts.
- NEVER allow ropes, electric cords, hoses, etc. to become entangled in the equipment when the cage platform is being raised or lowered.
- NEVER exceed manufacturer's load limits.
- NEVER exceed load ratings by transferring loads to cage platform at elevated heights.
- NEVER use cage to carry materials and never allow overhang of materials when raising or lowering cage platform.

1-4 MAINTENANCE SAFETY

Ensure the following general safety precautions are observed when maintenance is performed on the Odyssey 34 lift.

- ALWAYS perform maintenance procedures according to manufacturer's requirements. NEVER short change maintenance procedures.
- ALWAYS check hydraulic system. Make sure all lines, connectors, and fittings are tight and in good condition.
- ALWAYS keep all mechanisms properly adjusted and lubricated according to maintenance schedule and manufacturers specifications.
- ALWAYS perform a function check of operating controls before each use and after repairs have been made.
- ALWAYS locate and protect against possible pinch points prior to performing maintenance and repairs.
- ALWAYS use only factory approved parts to repair or maintain this equipment. If this equipment is rebuilt, retesting is required in accordance with factory instructions.
- NEVER add unauthorized fluids to the hydraulic system or battery. Check manufacturers specifications.
- NEVER exceed the manufacturer's recommended relief valve settings.
- NEVER attempt repairs you do not understand. Consult manufacturer if you have any questions regarding proper maintenance, specifications, or repair.

Battery Maintenance

Ensure the following general safety precautions are followed when battery maintenance is being performed on the Odyssey 34 lift.

- ALWAYS check battery acid level daily. Check battery test indicator for proper state of charge on maintenance free batteries before using lift.
- ALWAYS wear safety glasses when working near battery.
- ALWAYS avoid contact with battery acid. Battery acid causes serious burns. Avoid contact with skin or eyes. If accidental contact occurs, flush with water and consult a physician immediately.
- ALWAYS disconnect ground cable first when removing battery.
- ALWAYS connect ground cable last when installing battery.
- ALWAYS charge batteries in open, well ventilated areas.
- NEVER smoke when servicing battery.
- NEVER allow batteries to overcharge and boil.
- NEVER short across battery posts to check for current. NEVER break a live circuit at battery.
- NEVER jump start other vehicles using lift battery.

1-5 DAMAGED EQUIPMENT POLICY

Safety Statement

At Bil-Jax, we are dedicated to the safety of all users of our products. Therefore, all Bil-Jax lifts are designed, manufactured and tested to comply with current applicable Federal OSHA and ANSI codes and regulations.

Damage Policy

There may be occasions when a Bil-Jax lift is involved in an incident that results in structural damage to the lift. This can seriously compromise the ability of the lift to perform in a safe manner. Therefore, whenever a Bil-Jax lift is damaged structurally or when there is the possibility of structural damage (this damage may be internal and is not always visible to the naked eye), Bil-Jax requires that the lift be returned to our facility at 125 Taylor Parkway, Archbold, Ohio, for reconditioning. If you have any questions concerning what constitutes structural damage, please call the Bil-Jax Service Department at 419.445.9675.

Damage Repair Notice

There may be occasions when a Bil-Jax lift is involved in an incident resulting in non-structural damage. When this occurs and repairs are made by the owner or area distributor, please notify Bil-Jax of these non-maintenance repairs and request a repair form to be filled out and returned to Bil-Jax.

2
Introduction

2-1 GENERAL DESCRIPTION

The Odyssey 34 lift is designed and manufactured for use as a telescoping personnel lift. The maximum platform load is limited to 350 lbs. The electric pump motor is powered by a 12VDC battery. A 20 amp automatic battery charger is included for recharging the battery at the end of each work period.

Platform elevation is accomplished by means of a 2-1/4 inch displacement type hydraulic cylinder. The lower telescoping section is pushed vertically upward by the cylinder while the upper sections are raised by a mechanical motion advantage accomplished through two sets of chains and sheaves. Platform elevation and descent is controlled by pushbuttons on the main control box located on the back of the machine, or the transmitter mounted on the cage platform.

Safety of operation is assured by proper inspection and maintenance procedures as set forth in this manual. The possibility of platform free-fall is eliminated by proper maintenance and replacement of the chains, sheaves and sheave pins, a properly installed flow restrictor valve, and a clean mast. The adjustable restrictor valve controls and fixes the rate of platform descent whether empty or fully loaded to approximately 0.6 feet per second. A hydraulic hose failure will result in the same rate of descent, eliminating free-fall, when the restrictor valve is installed properly.

Emergency lowering of the platform is accomplished by means of a manual control valve located on the pump/motor unit.

The Odyssey 34 lift features a displacement type of cylinder that will not rust or corrode during storage since the cylinder rod is immersed in oil. It is important that the cylinder rod be kept clean and undamaged for the protection of the cylinder head packing.

The outrigger lock safety switches prevent the Odyssey 34 from raising until the four outriggers have been properly positioned and engaged. This helps to make the Odyssey 34 lift a safe, dependable machine.

Carefully read all the safety instructions contained in Section 1 of this manual before operating the Odyssey 34 lift.

2-2 SPECIFICATIONS

Odyssey Lift Electric Hydraulic Lift Platform

Model Number Odyssey 34 Serial Number _____

Manufactured by: Bil-Jax, Inc.
125 Taylor Parkway
Archbold, Ohio 43502
419.445.8915

Table 2-1. Specifications

Rated Platform Load	350 lbs (158.8 kg) total including operator
Extended Platform Height	34 ft (10.36 m)
Retracted Platform Height	6 in. (15 cm)
Platform Dimensions	28 in. x 30 in. (71 cm x 76 cm)
Base Dimensions (Outriggers Extended)	66 in. x 72 in. (168 cm x 183 cm)
Retracted Dimensions	29 in. wide x 74 in. long x 79 in. high (74 cm wide x 190 cm long x 201 cm high)
Gross Shipping Weight	1350 lbs (614 kg)
Full Extension Time	45 seconds empty, 50 seconds loaded
Complete Retraction Time	55 seconds empty, 45 seconds loaded
Platform Extension Rate	0.86 ft/sec (0.26 m/sec) empty 0.59 ft/sec (0.18 m/sec) loaded
Hydraulic System Pressure	1200 psi empty, 2000 psi loaded
Power Source	DC - 12 volt deep cycle battery

2-3 WARRANTY

Bil-Jax warrants its telescopic lifts for one year from the date of delivery against all defects of material and workmanship, provided the unit is operated and maintained in compliance with Bil-Jax's operating and maintenance instructions; structural components are warranted for three years. Bil-Jax will, at its option, repair or replace any unit or component part which fails to function properly in normal use.

This warranty does not apply if the lift and/or its component parts have been altered, changed, or repaired without the consent of Bil-Jax or by anyone other than Bil-Jax or its factory trained personnel, nor if the lift and/or its components have been subjected to misuse, negligence, accident or any conditions deemed other than those considered as occurring during normal use.

Components not manufactured by Bil-Jax are covered by their respective manufacturers warranties. A list of those components and their warranties is available upon written request to Bil-Jax.

Bil-Jax shall not in any event be liable for the cost of any special, indirect or consequential damages to anyone, product, or thing. This warranty is in lieu of all other warranties expressed or implied. We neither assume nor authorize any representative, or other person, to assume for us any other liability in connection with the sale, rental, or use of this product.

3
Operation

3-1 OPERATOR CONTROLS

The Odyssey 34 lift is equipped with several operator controls; a transmitter mounted in the cage platform to control the lift; a receiver mounted on the base to monitor and control the lift; an ON/OFF switch to turn power on or off; and a laser pointer to help position the lift before raising the platform.

Receiver

The receiver is located on the back of the base frame and contains four controls, UP and DOWN pushbuttons, an ENABLE pushbutton, and an EMERGENCY STOP pushbutton. The receiver also contains LEDs to monitor the operation of the lift and a signal strength indicator to monitor the strength of the signal being sent from the platform transmitter. While the operator normally does not raise or lower the lift from the receiver, the receiver does control the operation of the Odyssey 34 lift. When the operator pushes a pushbutton on the platform transmitter, the transmitter sends a signal to the receiver, the receiver processes that signal and controls the various lift functions. Refer to Figure 3-1.

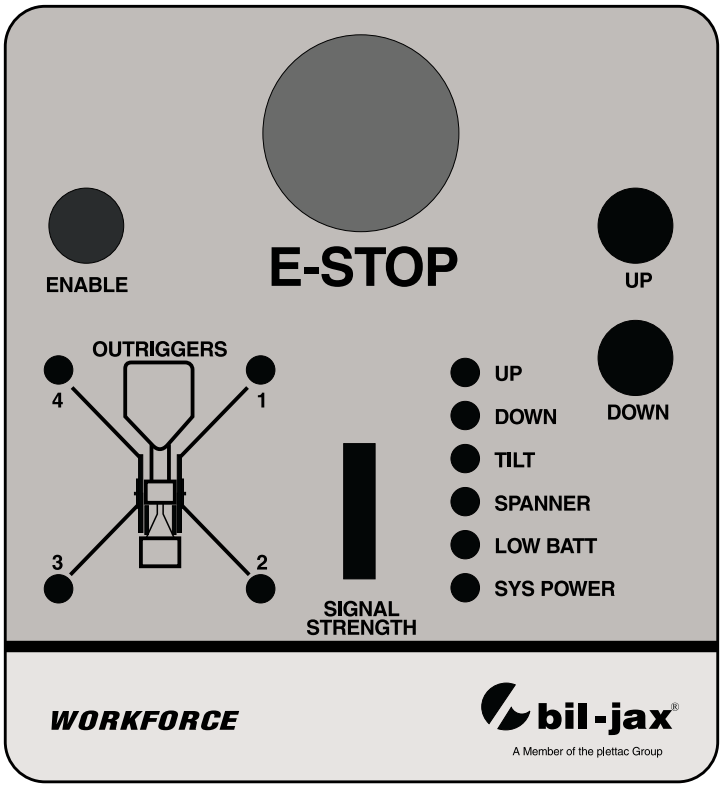


Figure 3-1. Receiver

Transmitter

The transmitter is located on the mast directly above the platform. The transmitter contains four controls, UP and DOWN pushbuttons, an ENABLE pushbutton, and an EMERGENCY STOP pushbutton. The controls on the upper control box are used to raise and lower the unit. There are no electrical connections between the transmitter and the receiver, or between the transmitter and the lift power supply. The transmitter operates from a 9-Volt battery installed in the transmitter control box. An LED monitors operation of the transmitter — a flashing LED indicates a low battery. The battery should be replaced with a new battery when the LED flashes. The LED will light with a steady glow when any control is activated and a signal is being sent to the receiver. Refer to Figure 3-2.

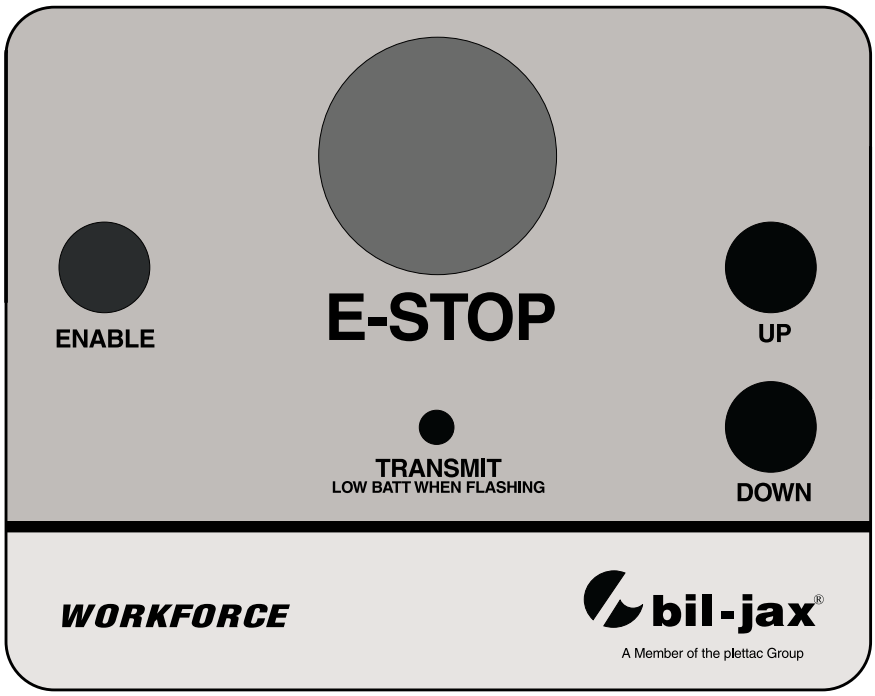


Figure 3-2. Transmitter

ON/OFF Switch

The ON/OFF switch is used to turn the battery power on or off to the lift. Turning the switch to the ON position activates the Audio Program 'Hal' and turns power on to the lift. To conserve battery power, the switch should be in the OFF position when the lift is not being used. Refer to Figure 3-3.

Figure 3-3. ON/OFF Switch

Laser Pointer

The laser pointer is used to help position the lift before it is raised. It is mounted on the side of the cage. To help position the lift before setting outriggers, turn the laser pointer ON and place it in its holder in an upright position. When the red dot from laser pointer is in the area where you want to work, this is the position you want the Odyssey 34 lift to be located before setting the outriggers. Refer to Figure 3-4.

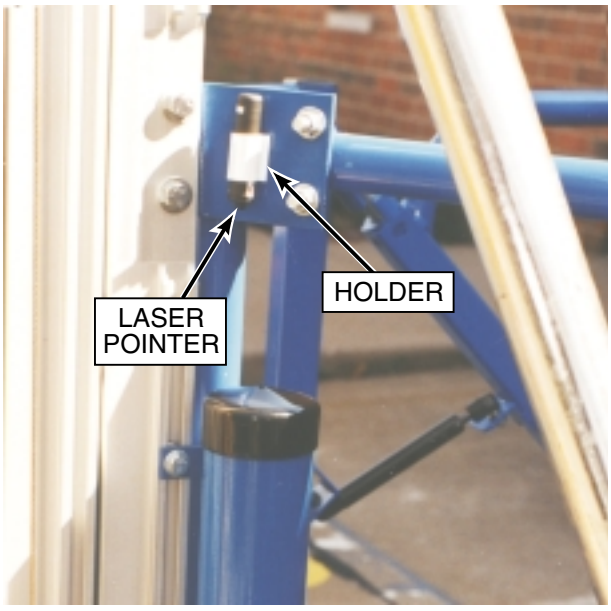


Figure 3-4. Laser Pointer

3-2 NORMAL OPERATING PROCEDURE

Perform the following procedures to operate the Odyssey 34 lift.

1. Read and follow all safety precautions contained in Section 1 and all responsibilities outlined in the ANSI A92.3 reprint contained in Section 7 of this manual.
2. Position the lift at the work area. Make sure the lift is on a firm and level surface and that there are no potential hazards such as overhead obstructions or electrically charged conductors. Do not operate the lift if such hazards exist.
3. Check the lift for damaged or worn parts and repair or replace as necessary.
4. Check to be sure that the cage platform is properly attached to the lift.
5. Pull the four outriggers away from the base. The spring-loaded pin on the jack should lock in place. If the spring-loaded pin does not lock in, unwind the jack until the pin snaps in place. Adjust each outrigger so that its footpad is firmly set. For best performance, assure that the wheels are off the ground.
6. Turn the ON/OFF switch to ON. Ensure that the E-STOP pushbutton is not engaged. The controller's audio program 'Hal' will start. Hal will instruct you how to proceed. Hal will tell you the lift is ready to operate or what outrigger needs to be adjusted; the corresponding LED will also be lit.
7. Adjust the outriggers until all LEDs are lit. When all outriggers are set properly and the unit is level, Hal will tell you the lift is ready to operate and the tilt LED will be off. To enable you to monitor the setting of the outriggers, LEDs for the corresponding outriggers are located on the sides of the main frame, Figure 3-5. When the outriggers are set properly the LEDs will be ON.

NOTE: The lift is equipped with a level sensor that will prevent the lift from raising if the lift is at a slope greater than 1.5 degree. The TILT LED on the receiver will light and the audio program will tell you that the lift is not level. Adjust the outriggers until the lift is level and the TILT LED is OFF.

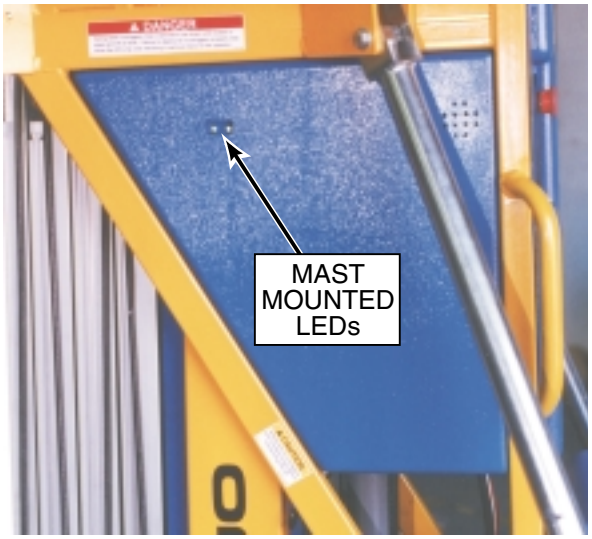


Figure 3-5. Outrigger LEDs on Main Frame

8. Enter the cage platform. Ensure that the cage gate is closed and engaged properly. A proximity switch in the gate will prevent operation of the lift if the gate is not properly closed.

9. The lift is now ready for operation. While depressing the ENABLE pushbutton, select the UP or DOWN pushbutton on the transmitter. The platform will raise or lower respectively. The EMERGENCY STOP pushbutton deactivates the control circuit.

3-3 EMERGENCY LOWERING PROCEDURE

The Odyssey 34 lift is equipped with a manual lowering valve in case of emergency situations to lower the platform. The emergency lowering valve is located on the hydraulic pump. The valve may be accessed through the opening on the side of the machine. To lower the platform, turn the red knob on the valve counterclockwise. Refer to Figure 3-6.

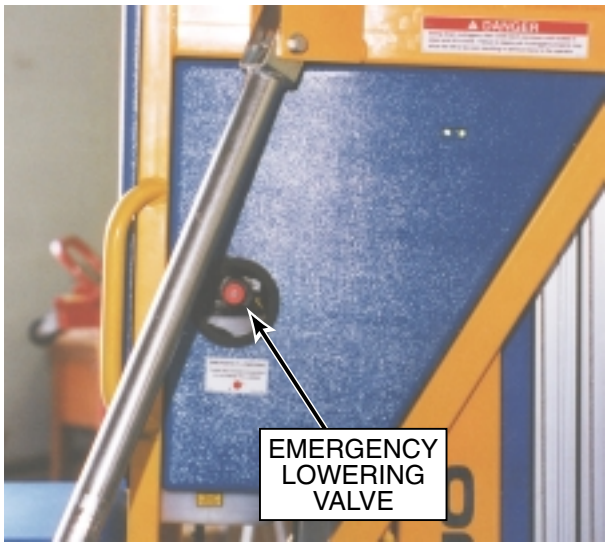


Figure 3-6. Emergency Lowering Valve

4
Maintenance

4-1 SCHEDULED SERVICE CHECKS

Daily/Weekly Service Checks

Perform the following daily/weekly service checks as listed in Table 4-1.

Table 4-1. Daily/Weekly Service Checks

Service Check	Daily before use	Weekly
Check chain assemblies for split leaves, loose pins, excessive wear, or elongation.	✓	
Check battery electrolyte level.	✓	
Check and retighten all nuts and bolts.	✓	
Check cage gate is secure.	✓	
Check to be sure slide blocks and their path are clean and lightly lubricated with a silicone lubricant.	✓	
Check level sensor.	✓	
Check to see that all decals are present.	✓	
Check that all functions on transmitter and receiver are operating properly.	✓	
Check for wear on chain sheaves, sheave axles, and bearings.		✓
Lubricate chains with 40W oil.		✓
Check wheels for wear on axles.		✓
Check surface of casters for cracks or excessive wear.		✓

Monthly Service Checks

Perform the following monthly service checks as listed in Table 4-2.

Table 4-2. Monthly Service Checks

Service Check	Every month	Every 6 months	Every 12 months	Every 48 months
Clean battery terminals.	✓			
Check operation of manual emergency lowering valve.	✓			
Lubricate wheels and axles.		✓		
Lubricate steel mast with dry silicone spray.		✓		
Check battery cables and wiring for loose connections and damaged wires.		✓		
Replace hydraulic oil.			✓	
Check slide blocks for wear.			✓	
Check for mast sway.			✓	
Load test with 350 pounds.			✓	
Replace lift chains.				✓

4-2 LUBRICATION

Lubrication makes operation of the Odyssey 34 lift more efficient and extends the life of the unit. Perform the following lubrication procedures.

1. Oil lift chains with clean 40W oil weekly or as needed. Refer to Figure 4-1.

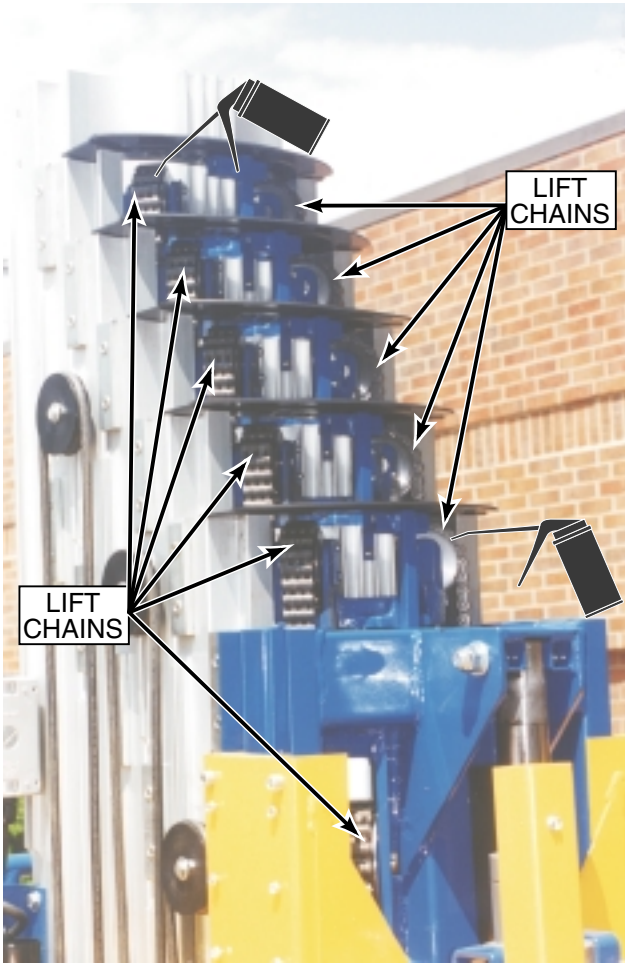


Figure 4-1. Lift Chain Lubrication

2. Grease both wheels and axles at the grease fittings on each wheel semiannually with wheel bearing grease. Refer to Figure 4-2.

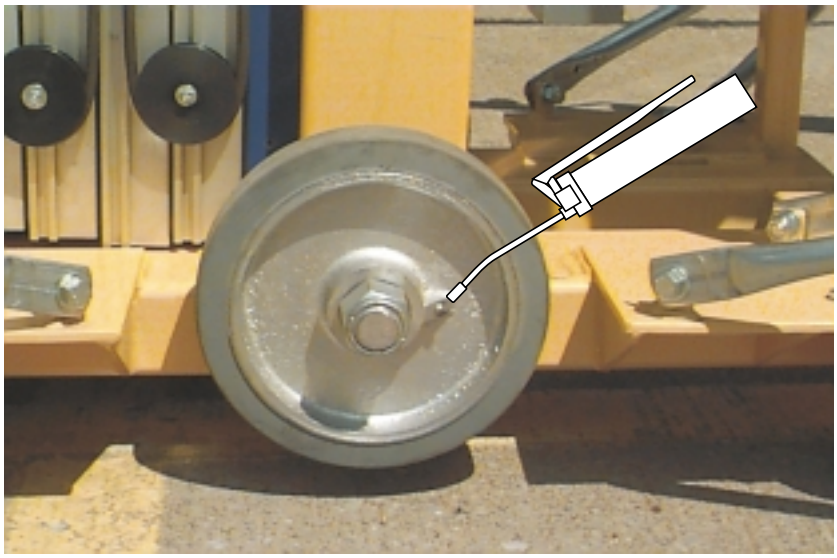


Figure 4-2. Wheel and Axle Lubrication

3. Lubricate the steel mast slides with dry silicone spray semiannually. Apply a light spray coating to the slide surfaces as shown in Figure 4-3.

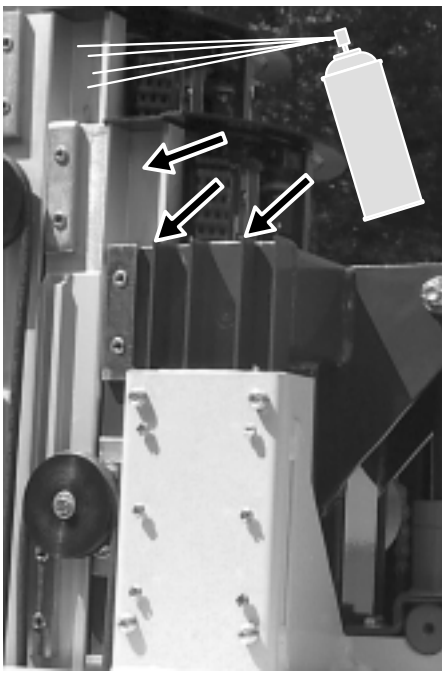


Figure 4-3. Steel Mast Slide Lubrication

NOTE: The plastic slide blocks in the mast are made of a bearing material which has a high degree of lubricity and need only be kept clean. However, precautions should be taken to ensure that the paths along which the blocks move are kept clean and lightly lubricated with a dry type silicon lubricant.

4-3 HYDRAULIC SYSTEM

Hydraulic system maintenance varies by the amount of use and the environment in which the lift is used. Constant attention to keep the oil clean and the reservoir properly filled will help prevent possible damage to the system.

Hydraulic System Inspection

Check the hydraulic hose and fittings for leaks and damage daily. Tighten or replace as necessary to prevent hydraulic oil loss. Refer to the hydraulic schematic diagram in Section 6 for general reference.

Fluid Check and Replacement

The reservoir should be filled to within 1/2 inch of the top with the platform in its lowest position. The lift is shipped from the factory with Energol HLP-HD46 (BP Oil), a high grade, non-foaming hydraulic oil designed for temperatures as low as -20°F/-29°C. Use Dextron Automatic Transmission Fluid Type A for temperatures as low as -40°F/-40°C. If either oil is not available, a good grade SAE 10W hydraulic oil may be used where the minimum climatic temperature is above 32°F/0°C. SAE 5W hydraulic oil may be used where temperatures are as low as 0°F/-18°C. Do not mix different hydraulic oils. Clean the reservoir sump strainer and replace the hydraulic oil at least once a year or whenever it becomes contaminated.

Hydraulic System Air Bleeding Procedure

Delayed response or sporadic action in the unit may indicate a presence of air in the cylinder. Perform the following procedure to bleed air from the system.

1. Fill the reservoir with the proper hydraulic fluid.
2. Fully extend the lift.
3. Lower the unit to allow the oil with entrapped air to return to the reservoir, being careful not to overflow it.
4. Let the unit set while the air escapes the fluid and then repeat if necessary. Each time the platform is lowered, refill the reservoir to prevent pumping more air into the cylinder.

Pressure Relief Valve Reset

Perform the following procedure to reset the pressure relief valve. Refer to Figure 4-4.

1. Disconnect the hydraulic hose from the main pressure port.
2. Install a 4000 psi gage into the main pressure port in the pump unit.

⚠ CAUTION

Do not adjust the pressure relief valve higher than 2300 psi. Overloading may occur at pressures greater than 2300 psi.

3. Remove the hex cover from the pressure relief valve.
4. While depressing the ENABLE and UP pushbutton on the lower control box, adjust the screw until maximum pressure of 2300 psi is obtained.
5. After adjusting the pressure relief valve, replace the hex cover, remove the 4000 psi gage, and reconnect the hydraulic hose to the main pressure port.
6. If a gage is unavailable, place 400 pounds on the platform and adjust the pressure relief valve screw so that the load can just be lifted without bypassing oil through the pressure relief valve.

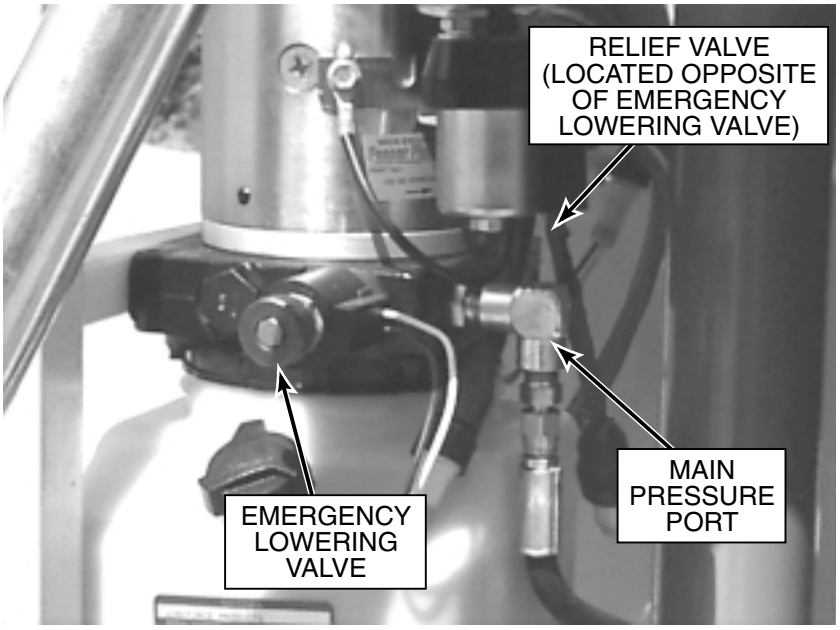


Figure 4-4. Pressure Relief Valve Adjustment

Down Valve Operation Check and Adjustment

The adjustable down valve (13, Figure 4-5) is located in the base of the hydraulic cylinder. When properly adjusted, the down valve will allow the cylinder to fully retract in 35 to 39 seconds.

Adjust the down valve with the cylinder fully retracted. Loosen the lock nut and turn the adjusting screw in to extend the retract time and out to shorten the retract time. Extend the cylinder and note the time it takes to retract. Adjust as necessary to extend or shorten the retract time. When the cylinder is retracting properly, hold the adjusting screw and tighten the lock nut.

Hydraulic Cylinder Repair

⚠ CAUTION

Removing the hydraulic cylinder from the Odyssey Lift requires major disassembly of the unit. Contact Bil-Jax for assistance before removing the hydraulic cylinder from the unit.

Hydraulic Cylinder Removal

It is recommended that Bil-Jax be contacted for assistance before removing the hydraulic cylinder.

⚠ WARNING

Keep hands and feet away from elevated masts at all times.

1. Raise lift far enough to place scrap 4 x 4 wood block(s) under the main (welded) mast. Lower lift down onto the block(s) and turn off the main power.
2. Remove mounting bolt (10), washers (9), and nut (8) securing the top of the hydraulic cylinder rod to the main (welded) mast.
3. Open the emergency lowering valve (See Figure 3-6) and use a pry bar to lower the cylinder rod down from the main (welded) mast connection.
4. Be sure cylinder is retracted and pressure is released from the system. Place a pan underneath the hydraulic cylinder to catch the hydraulic oil.
5. Disconnect the hydraulic hose from the bottom of the cylinder and drain the remaining hydraulic oil.
6. Remove four bolts (2, Figure 6-3), lock washes (3), and two cylinder brackets (4) securing cylinder (7) to the base. Lift the cylinder to remove it from the mounts on the base unit.
7. After maintenance has been performed on the hydraulic cylinder, reinstall the cylinder in the mounts on the base unit, reconnect the hydraulic hose, and close the emergency lowering valve. Turn on the main power, raise the lift until the cylinder rod slides back into the main (welded) mast connection, and reinstall the mounting bolt, washers, and nut.

Hydraulic Cylinder Repair Procedure

Perform the following procedure to repair and maintain the hydraulic lift cylinder. Refer to Figure 4-5. It is recommend that whenever the hydraulic cylinder is disassembled that all seals be replaced; order seal kit B02-13-0099.

Disassemble and inspect the hydraulic cylinder as follows:

1. Remove retaining ring (14, Figure 4-5) by rotating cylinder head (5) clockwise until the edge of the retaining ring appears in the milled opening of cylinder tube (12).
2. Pull cylinder head (5) assembly off the end of cylinder rod (1) and from cylinder tube (12).
3. Pull assembled cylinder rod (1) and piston (8) from the cylinder tube.
4. Remove piston nut (11) and remove piston (8) assembly from the end of the rod.
5. Remove wiper (3), u-cup seal (4), static o-ring (7), and back-up ring (6) from cylinder head (5). Discard all parts.
6. Remove u-cup seals (9 and 10) from piston (8). Discard the u-cup seals.
7. Inspect rod (1) for any scratches or pits. Pits that go into the base metal are unacceptable. Scratches that catch the fingernail, but are not through the base metal or less than 1/2 inch long and are around the rod, are acceptable providing they are not sharp enough to cut the seal. The rod surface should not have any of the chrome worn through. Replace the rod if any of these conditions are not met.
8. Inspect cylinder head (5). Check the inside bore of the cylinder head for scratches; deep scratches are unacceptable. Check the bore for polishing — polishing indicates uneven loading. The bore should be checked for out-of-roundness; if the bore is more than 0.007 inch out-of-round, the head should be replaced. Damage to any of the seal grooves is unacceptable. Replace the head if any of these conditions are not met.
9. Inspect piston (8). Check the outside surface of piston for scratches; deep scratches are unacceptable. Check the outside surface for polishing. If polishing is noticed, the piston should be checked for out-of-roundness. If out-of roundness exceeds 0.007 inch, the piston should be replaced. Damage to any of the seal grooves is unacceptable. Replace the piston if any of these conditions are not met.
10. Inspect cylinder tube (12) for any scratches or pits. Pits or scratches that are deep enough to catch the fingernail are not acceptable. Scratches that catch the fingernail, but are less than 1/2 inch long and are around the tube, are acceptable providing they are not sharp enough to cut the seal. Replace the cylinder tube if any of these conditions are not met.

Assemble the hydraulic cylinder as follows:

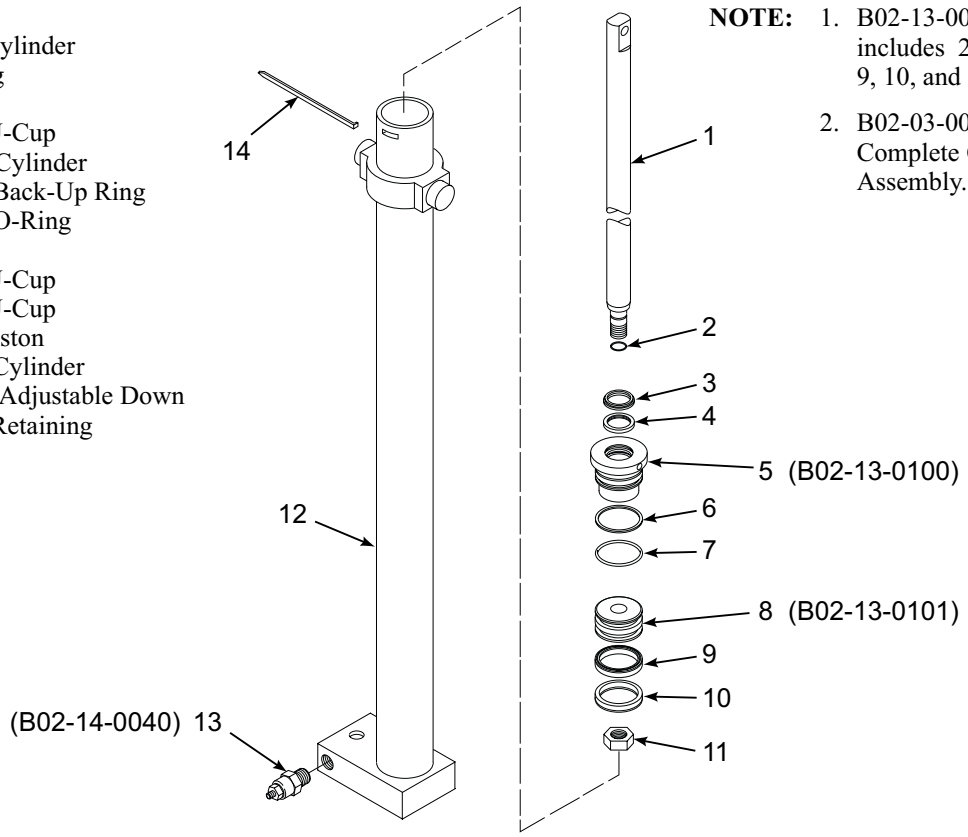
11. Lubricate piston (8) and u-cup seals (9 and 10) with hydraulic fluid.
12. Stretch u-cup seals (9 and 10) into the grooves. The sealing lips of the u-cup seals should face toward the outside face of the piston. Be careful to avoid damaging the seal grooves during installation; scratching the grooves may cause bypass leakage. Allow the assembled piston to sit 1 hour to allow the seals to return to shape.
13. Lubricate cylinder head (5), wiper (3), u-cup seal (4), static back-up ring (6), and static o-ring (7) with hydraulic fluid.
14. Twist dual lip u-cup seal (4) into a ‘C’ shape and allow it to snap into the lower groove.
15. Twist wiper (3) into a ‘C’ shape and allow it to snap into the outer groove.

16. Install static back-up ring (6) and static o-ring (7) into the static seal groove in the head. Make sure the back-up ring is installed closest to the retaining ring groove. Allow the assembled head to sit 1 hour to allow the seals to return to shape.

17. Thoroughly rinse the inside of cylinder tube (12) with a high-pressure rinse and wipe with a lint free cloth.

18. Install the head assembly followed by the piston assembly onto the rod. Torque piston nut (11) to 100-120 ft. lbs.

1. Rod, Cylinder
2. O-Ring
3. Wiper
4. Seal, U-Cup
5. Head, Cylinder
6. Static Back-Up Ring
7. Static O-Ring
8. Piston
9. Seal, U-Cup
10. Seal, U-Cup
11. Nut, Piston
12. Tube, Cylinder
13. Valve, Adjustable Down
14. Ring, Retaining



NOTE:
1. B02-13-0099 Seal Kit includes 2, 3, 4, 6, 7, 9, 10, and 14.
2. B02-03-0019 is the Complete Cylinder Assembly.

Figure 4-5. Hydraulic Cylinder Exploded View

19. Apply anti-seize to the head outer surface, especially static o-ring (7).

20. Coat the entire rod assembly with hydraulic fluid and insert the rod into the cylinder tube. When inserting cylinder head (5), make sure that static o-ring (7) does not extrude into the retaining ring slot in the cylinder tube. Be careful not to nick the seals as they enter the cylinder tube.

21. Rotate the cylinder head until the retaining ring hole is visible through the slot milled into the tube. Insert retaining ring (14) hook into the hole and rotate the head 1-1/4 turns until the retaining ring is completely pulled into the cylinder tube and the ends are covered.

22. Reinstall the hydraulic cylinder into the unit and reconnect the hydraulic hose. Refill hydraulic fluid reservoir.

23. Pressurize the cylinder and extend one full stroke to fill it with hydraulic fluid and remove any trapped air.

4-4 ELECTRICAL SYSTEM

Regular maintenance is necessary to keep the electrical system in proper working order. Check daily all electrical wires for cuts, broken wires, potential short circuits, and any other damage.

Battery Care and Charging

The electric system is designed to provide power for a normal work shift. However, the charge life of the battery pack depends on machine usage. Plan your work to prevent unnecessary use of electrical power.

Since the power source for the machine is a battery, proper battery care is important. Recharge the battery after each work shift. When the machine is not being used, batteries should be charged at least once a week. Normal battery charging time should be 10 to 12 hours. If the battery is extremely low, charging time may be as long as 24 hours.

Clean battery terminals monthly. Remove the cables from the battery, clean the battery posts and cable ends to shiny metal, and replace. Always connect the insulated cable from the starter solenoid to the positive post. Lubricate the outside of the connections with petroleum jelly or grease.

Battery Charging Procedure

1. Connect an extension cord from a 110V AC 60 Hz outlet to the flush mount receptacle on the side of the Odyssey Lift. The extension cord should be kept as short and as large as possible to reduce voltage drop.
2. When there is power to the battery charger the ammeter will display the rate of charge.

⚠ CAUTION

Before making or breaking connections between charger and battery, always remove the power cord from the 110 volt AC outlet. Always check the battery electrolyte level and add water after charging the battery. For more information, refer to the instructions supplied with the battery charger.

3. Unplug the extension cord from the flush mount receptacle on the side of the Odyssey Lift.

4-5 LIFT CHAINS AND SLIDE BLOCKS

⚠ WARNING

Do not operate a unit on which any chain assembly is damaged or in need of replacement. Operating a unit with a damaged chain can cause severe injury or death to personnel and damage to equipment.

Inspect all lift chains daily. Inspect for signs of wear, split leaves, loose pins, clevis damage, and elongation. Replace any chain which is damaged in any way. Chain assemblies may be ordered from your dealer or direct from the factory. Do not operate a unit on which any chain assembly is damaged and in need of replacement.

Chain Elongation Inspection

First Mast Chain (BL-566 Chain)

One pitch of chain should measure 5/8 in. (1,5875 cm). Measure 20 pitches of chain. The ideal measurement for 20 pitches of chain should be 12.5 in. (31,75 cm). Replace the chain if 20 pitches measure over 12.75 in. (32,385 cm). Refer to Figure 4-6.

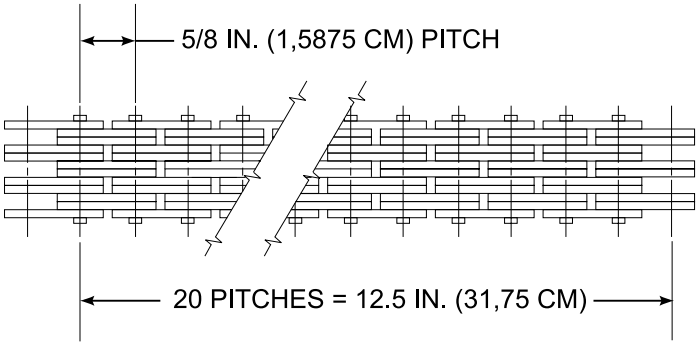


Figure 4-6. BL-566 Chain Elongation Inspection

Second through Sixth Mast Chain (BL-466 Chain)

One pitch of chain should measure 1/2 in. (1,2700 cm). Measure 20 pitches of chain. The ideal measurement for 20 pitches of chain should be 10.0 in. (25,40 cm). Replace the chain if 20 pitches measure over 10.25 in. (26,035 cm). Refer to Figure 4-7.

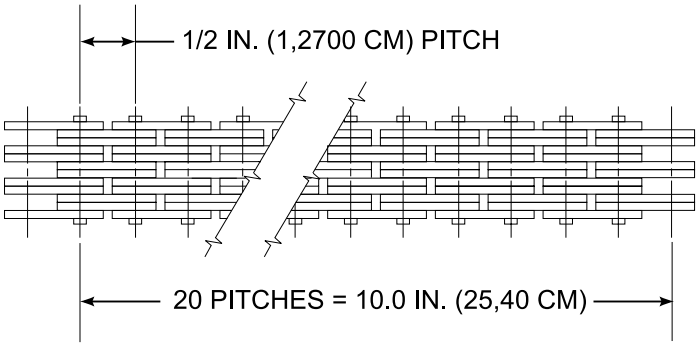


Figure 4-7. BL-466 Chain Elongation Inspection

NOTE: It is recommended that chains be replaced every four years unless damage or wear requires replacement at a lesser interval.

Lift Chain Adjustment

1. Raise the platform to the maximum extended height and then lower it while someone checks to see that all sheaves are turning, and checks for chain damage or wear.
2. Chains should be tight to the touch with no loose play. Check all lift chains for snugness. If a chain is loose, it will need to be adjusted.
3. After the platform is completely lowered, raise the complete Odyssey 34 lift with a fork lift. Insert the forks into the fork lift openings in the base from the lower control box end.
4. Loosen lock nut (48, Figure 6-1) attaching clevis pin (50) to lifting bar (47). Tighten hex nut (49) until the chain just becomes snug. Do not overtighten any chain so that the mast is raised from its resting position.
5. Make sure lock nuts (48) are turned onto the threaded clevis ends with at least 1/8 in. of the clevis end extending through the nut. Replace any lock nut which does not stay in position during use.

Slide Block Adjustment

Annually check for wear on the slide blocks and replace or retighten as necessary. If the lift exhibits excessive mast sway, it is probable that the slide blocks need adjustment. The slide blocks should be adjusted so that there is no air gap between the slide block and the mast the slide block is moving against. There are 4 adjustable slide blocks. The adjustment procedure is the same for all slide blocks. Refer to Figure 4-8.

1. Loosen, do not remove, the slotted hex head screw securing the slide block to be adjusted.
2. Using an allen wrench, turn the set screws in (clockwise). This will push the block in against the mast. Do not overtighten. Tighten the slotted hex head screw to secure the slide block in position.
3. Check all slide blocks and make adjustments as necessary.
4. After all adjustments are made, fully extend the lift. If the platform can be lowered without stopping then the blocks are properly adjusted.

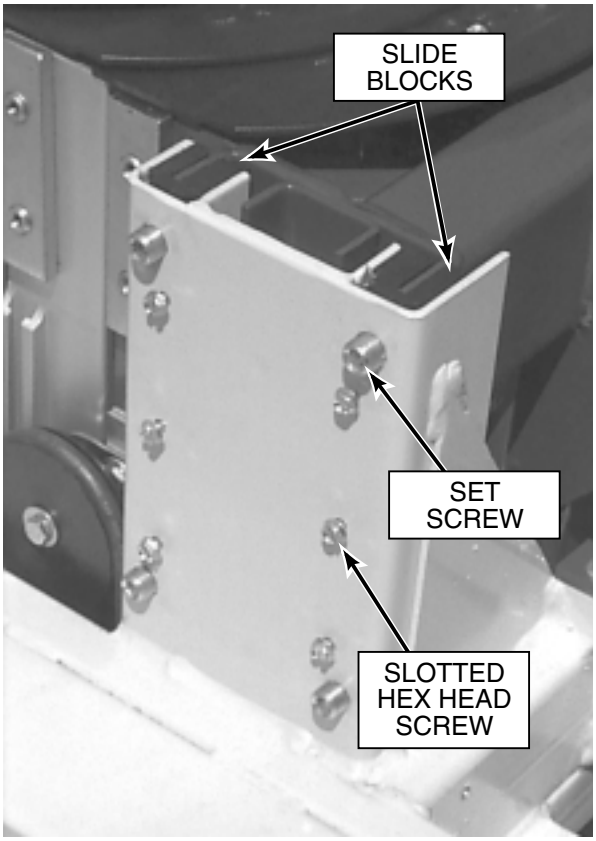


Figure 4-8. Slide Block Adjustment

NOTE: The plastic slide blocks in the mast are made of a bearing material which has a high degree of lubricity and need only be kept clean. However, precautions should be taken to ensure that the paths along which the blocks move are kept clean and lightly lubricated with a dry type silicon lubricant.

Guide Peg Adjustment

Annually check for wear on guide pegs (9, Figure 6-1 and 1, Figure 6-2) and replace or retighten as necessary. If any of the masts exhibit excessive side sway, it is probable that the guide pegs need adjustment. The guide pegs should be adjusted so that there is no air gap between the guide peg and the mast. There are 8 adjustable guide pegs per aluminum mast and 12 adjustable guide pegs on the steel mast. The adjustment procedure is the same for all guide pegs. Refer to Figure 4-9.

1. Using an allen wrench, turn the set screws in (clockwise). This will push the guide peg in against the mast. Do not overtighten.
2. Check all guide pegs and make adjustments as necessary.
3. After all adjustments are made, fully extend the lift. If the platform can be lowered without stopping, then the guide pegs are properly adjusted.

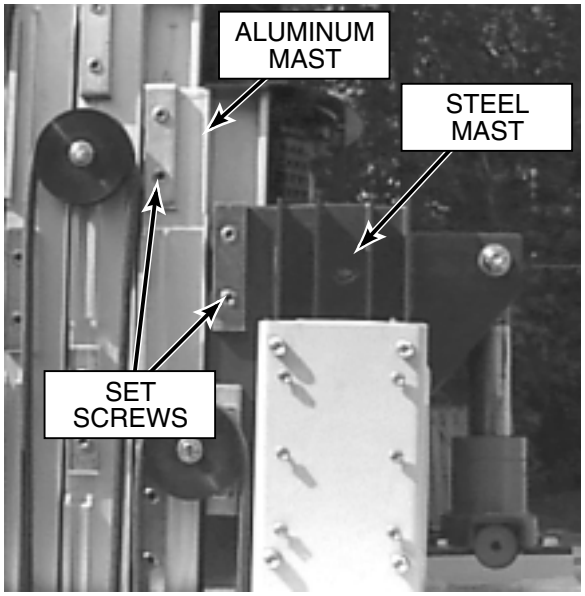


Figure 4-9. Guide Peg Adjustment

NOTE: The plastic guide pegs in the mast are made of a bearing material which has a high degree of lubricity and need only be kept clean. However, precautions should be taken to ensure that the paths along which the guide pegs move are kept clean and lightly lubricated with a dry type silicon lubricant.

4-6 TROUBLESHOOTING

Table 4-3. Troubleshooting Chart

Problem	Cause	Correction
1. Control panel LEDs will not light and audio program 'Hal' will not respond.	a. Low voltage*.	a. Recharge battery or replace if damaged.
	b. Master power switch turned off.	b. Turn on master power switch.
	c. Emergency stop button is activated (pushed in).	c. Pull out on emergency stop button.
	d. Burned out LED.	d. Replace LED board.
	e. Two parts of battery connector plug not mated together.	e. Mate battery connector plug parts together.
2. Control Panel LEDs will not turn off.	a. Lift is out of level.	a. Level lift with outrigger jacks or relocate lift to level surface.
	b. Broken or loose wire.	b. Repair or replace wire.
3. When UP switch is selected, motor runs but unit will not lift a load.	a. More than 350 lbs. on platform.	a. Ensure load is 350 lbs. or less.
	b. NO (Normally Open) valve is not being energized.	b. Check voltage at NO valve. If no voltage, check for loose or broken wire. If voltage, ensure at least 9 volts for start solenoid operation. Check battery and start solenoid. Repair or replace as needed.
	c. Emergency lowering valve is open.	c. Close emergency lowering valve.
	d. Mast sections are dirty.	d. Clean and lubricate masts with dry silicone.
4. Masts have excessive sway when fully extended.	a. Plastic slide blocks are out of adjustment.	a. Refer to Slide Block Adjustment in Section 4-5.
	b. Plastic guide pegs are out of adjustment.	b. Refer to Guide Peg Adjustment in Section 4-5.

*NOTE: Smart start solenoid will not engage if battery charge drops below 9 volts.

Table 4-3. Troubleshooting Chart, Continued

Problem	Cause	Correction
5. Pump/motor will not run when UP is selected.	a. EMERGENCY STOP button is activated (pushed in).	a. Turn EMERGENCY STOP button counterclockwise to deactivate.
	b. Motor start relay is not activating.	b. Check voltage at white wire on motor start relay. If voltage, replace defective motor start relay. If no voltage, check for loose or broken wire. Repair or replace wire.
	c. Motor start relay is activating, but motor does not run.	c. Check hydraulic gear pump for seizure. If seized, replace pump. If not, check motor. Motor may need replacement.
	d. Low voltage*.	d. Recharge or replace the battery.
	e. Outrigger is not set.	e. Set all outriggers.
	f. Level sensor is out of level.	f. Level machine.
6. When two parts of battery connector plug are mated together, the motor runs without UP switch being selected.	a. Short in electrical system.	a. Repair or replace any loose or broken wires.
	b. Motor start relay is stuck in "ON" position.	b. Replace defective motor start relay.
7. Hydraulic cylinder leaks at gland nut.	a. Defective seals.	a. Replace seals in hydraulic cylinder. Refer to Hydraulic Cylinder Repair in Section 4-3.
8. Outrigger will not set after extensive winding of jack handle.	a. Spring-loaded pin on outrigger jack failed to engage due to over extension of the jack.	a. Unwind jack handle, retracting foot pad, until the spring-loaded pin snaps into place. Then, wind jack down until foot pad is firmly set and outrigger LED is lit.

*NOTE: Smart start solenoid will not engage if battery charge drops below 9 volts.

5
Replacement Decals

Refer to Table 5-1, and Figures 5-1, 5-2, and 5-3 for descriptions and locations of decals on the Odyssey Lift.

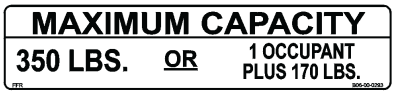
Table 5-1. Replacement Decals

Decal No.	Description of Decal	Qty
B06-00-0009	Warning….Moving telescopic masts…	1
B06-00-0034	Danger….Failure to comply with instructions…	1
B06-00-0135	Danger….Failure to comply with safety instructions…	1
B06-00-0139	Danger….Before using…	1
B06-00-0146	Danger….(High voltage line warning)	1
B06-00-0151	Danger….110 Volt	1
B06-00-0189	Warning….Level machine…	1
B06-00-0192	Operation Instructions	1
B06-00-0286	Emergency Lowering	1
B06-00-0289	Hydraulic Fluid Level	1
B06-00-0293	Maximum Capacity….350 Lbs.	1
B06-00-0360	Warning….Tip Over Hazard	1
B06-00-0361	Warning….(Various)	1
B06-00-0362	Warning….(Odyssey™ Instructions)	1
B06-00-0363Y	Bil-Jax (Both sides of toe board)	2
B06-00-0364	Odyssey 34 (Vertical transfer decal)	2
B06-00-0365	Danger….Swing down outriggers…	2
B06-00-0366	Caution….Always secure outriggers…	2
B06-00-0367	Warning….Pinch Point	1
B06-00-0359	Serial Number Plate (not available as replacement part)	1

B06-00-0009

B06-00-0192

B06-00-0189



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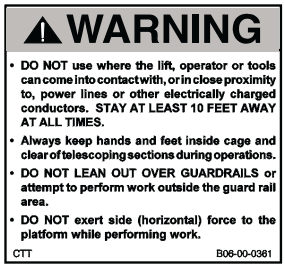


B06-00-0361

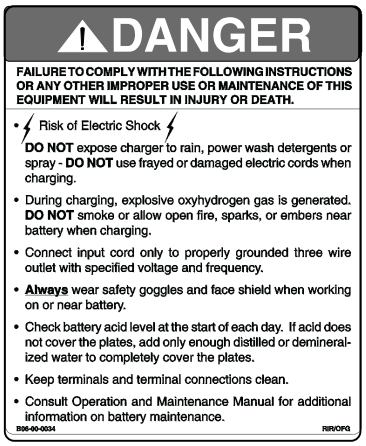
B06-00-0367

B06-00-0151

B06-00-0139

B06-00-0363Y

B06-00-0364



B06-00-0034

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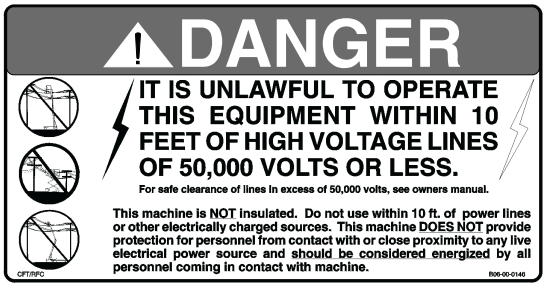

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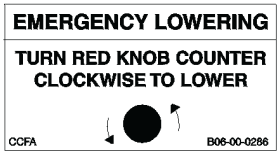
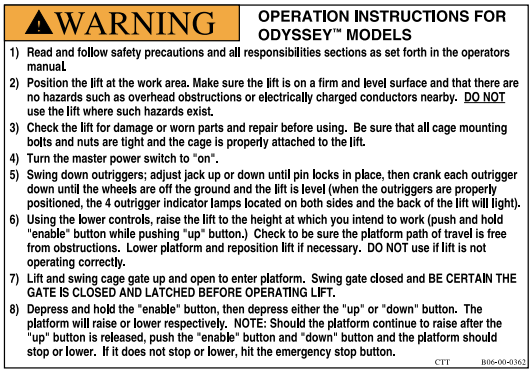


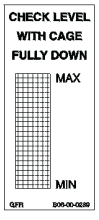
B06-00-0286

B06-00-0365

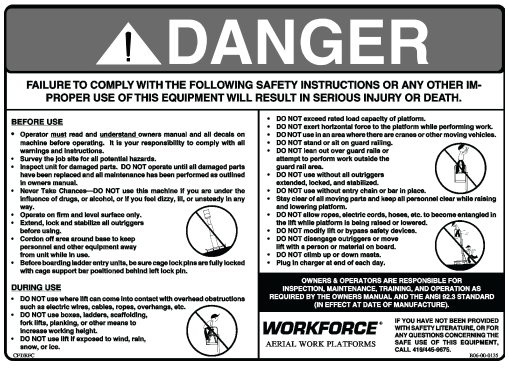
B06-00-0366



B06-00-0362



B06-00-0289



B06-00-0135

Figure 5-1. Replacement Decals

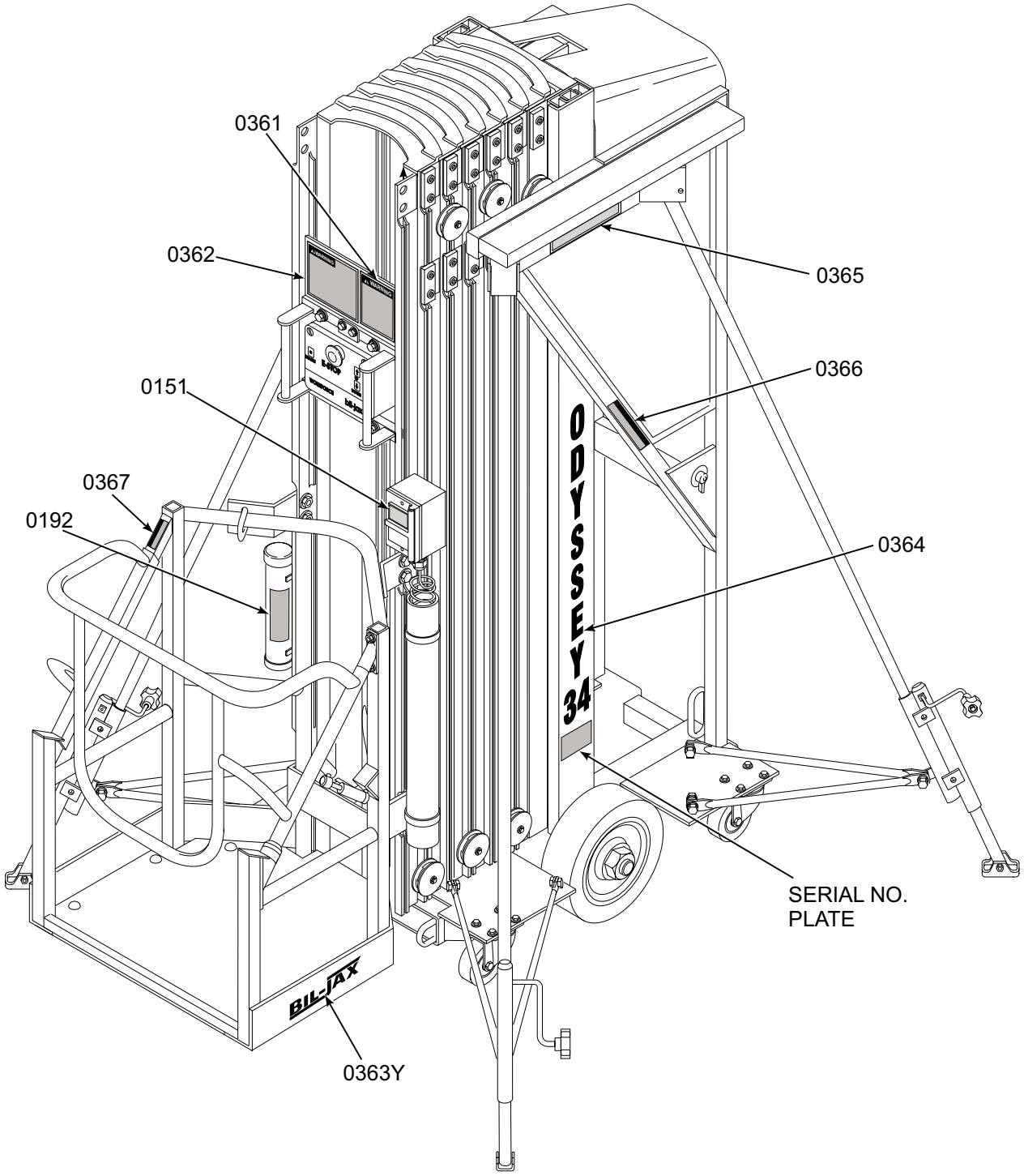


Figure 5-2. Decal Locations, Carriage and Base

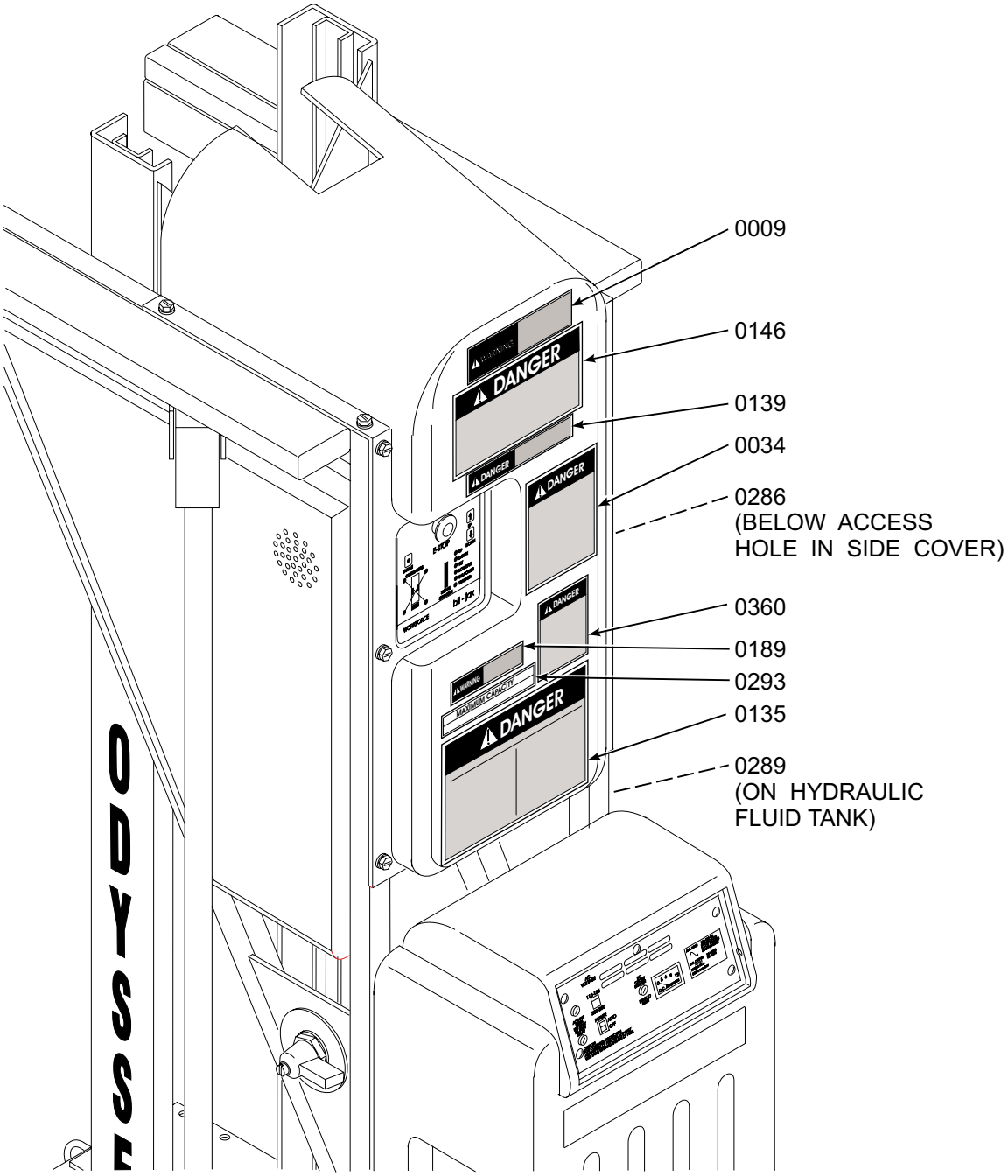


Figure 5-3. Decal Locations, Continued

6
Parts List

6-1 ALUMINUM MASTS PARTS LIST

Refer to Table 6-1 for the parts list for the aluminum masts.

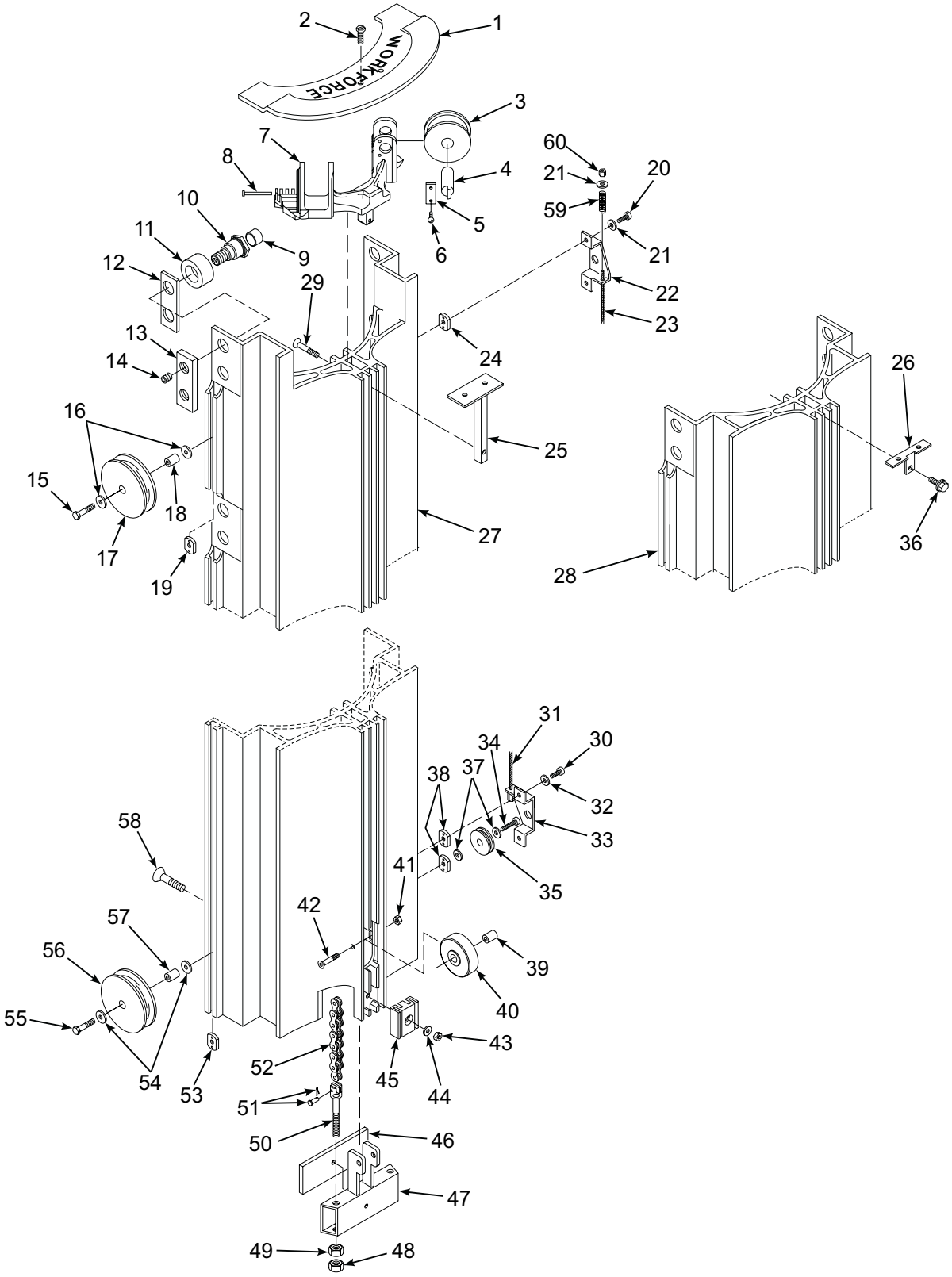


Figure 6-1. Aluminum Masts Exploded View

Table 6-1. Aluminum Mast Parts List

Item No.	Part No.	Description	Qty	Qty	Qty	Qty	Qty	Qty
		6th Mast Assembly, Carriage	**X**					
		5th Mast Assembly		**X**				
		4th Mast Assembly			**X**			
		3rd Mast Assembly				**X**		
		2nd Mast Assembly					**X**	
		1st Mast Assembly						**X**
1	B18-00-0139	Cover, Mast	1	1	1	1	1	1
2	0090-0344	Screw, 10-24 x 1/2 in. Threadcutting		2	2	2	2	2
3	B26-00-0021	Sheave with Bushing, 2 in.		2	2	2	2	2
4	B36-01-0025	Axle, 5/8 in., Sheave		2	2	2	2	2
5	B07-06-5407	Plate, End, Axle		2	2	2	2	2
6	0090-0924	Screw, 10-24 x 3/8 in., Threadcutting		4	4	4	4	4
7	B45-00-0010	Bracket, Sheave Mounting		1	1	1	1	1
8	B04-07-0113	Pin, Clevis		2	2	2	2	2
9	B31-00-0030	Guide Peg		8	8	8	8	8
10	B04-07-0108	Axle Bolt, Roller		8	8	8	8	8
11	B05-05-0006	Roller		8	8	8	8	8
12	B07-06-5386	Plate, Clamping, Roller		4	4	4	4	4
13	B07-06-5387	Plate, Mounting, Roller		4	4	4	4	4
14	0090-0363	Screw, Set, 1/4-20 x 3/4 in.		8	8	8	8	8
15	0090-0688	Bolt, 1/4-20 x 1 in.			1		1	
16	0090-0419	Washer, Flat, 1/4 in.			2		2	
17	B26-00-0019	Sheave, Cable			1		1	
18	B25-00-0066	Spacer			1		1	
19	B04-02-0002	T-Nut, 1/4-20			1		1	
20	0090-0001	Screw, 1/4-20 x 1/2 in.			2	2	2	2
21	0090-0419	Washer, Flat, 1/4 in.			3	3	3	3
22	B07-06-5437	Bracket, Cable			1	1	1	1
23	B40-00-0024	Cable			1	1	1	1
24	B04-02-0002	T-Nut, 1/4-20			2	2	2	2
25	B29-00-0136	Bracket, Cover		1	1	1	1	1
26	B29-00-0142	Bracket, Cover	1					
27	B24-00-0005-074	Mast Extrusion		1	1	1	1	1
28	B24-00-0006-074	Mast Extrusion, Carriage	1					
29	0090-0921	Screw, Skt. Hd., Ctsk., 5/16-18 x 2-1/8 in.		1	1	1	1	1
30	0090-0001	Screw, 1/4-20 x 1/2	2	2	2	2	2	2
31	B40-00-0024	Cable	1	1	1	1	1	1
32	0090-0419	Washer, Flat, 1/4 in.	2	2	2	2	2	2

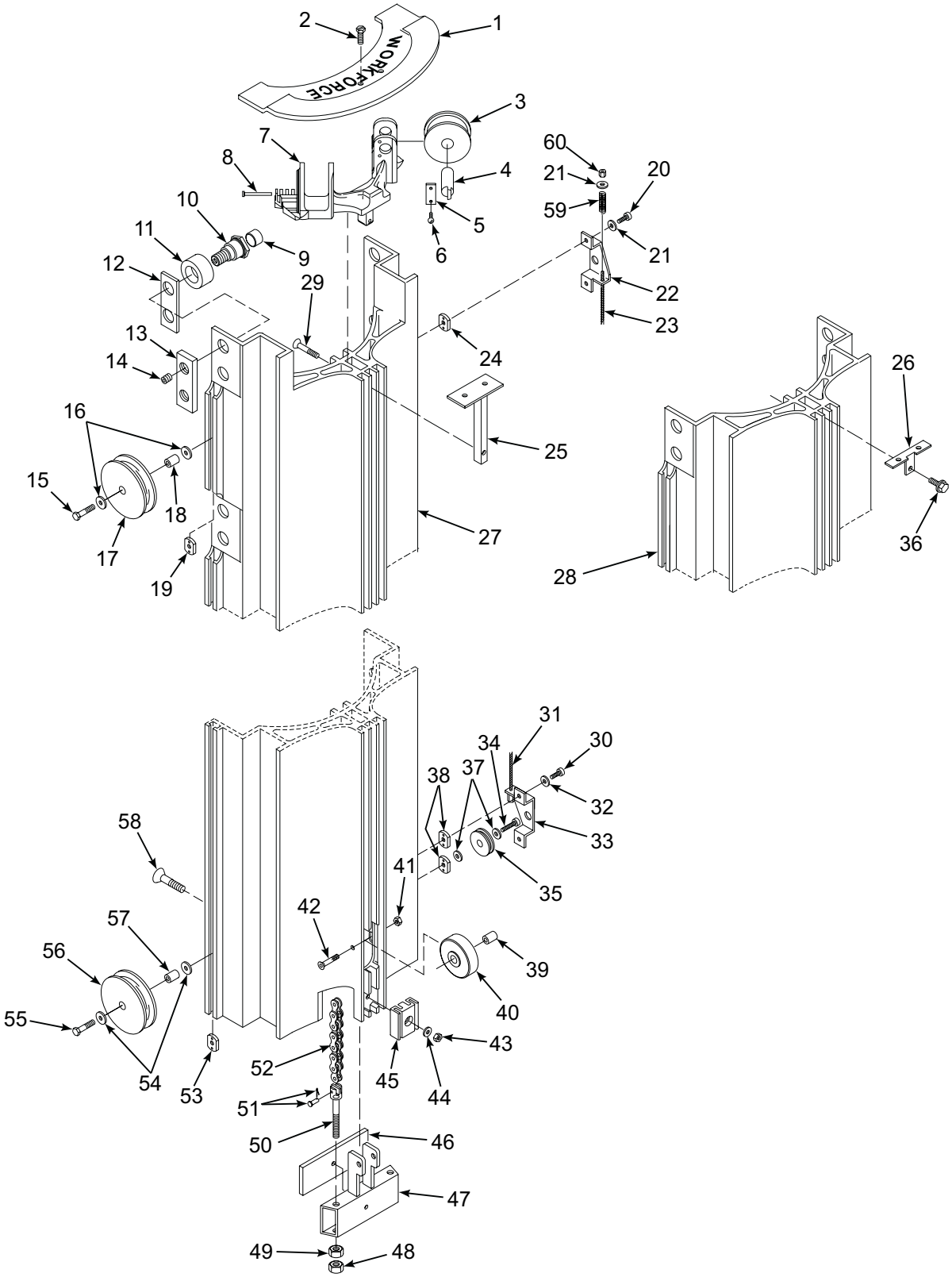


Figure 6-1. Aluminum Masts Exploded View, Continued

Table 6-1. Aluminum Masts Parts List, Continued

Item No.	Part No.	Description	Qty	Qty	Qty	Qty	Qty	Qty
		6th Mast Assembly, Carriage	**X**					
		5th Mast Assembly		**X**				
		4th Mast Assembly			**X**			
		3rd Mast Assembly				**X**		
		2nd Mast Assembly					**X**	
		1st Mast Assembly						**X**
33	B07-06-5437	Bracket, Cable	1	1	1	1	1	1
34	0090-0927	Screw, Socket Head, 1/4-20 x 1 in.		1	1	1	1	1
35	B26-00-0020	Sheave, Cable		1	1	1	1	1
36	0090-0472	Screw, 10-24 x 1/2 in., Sheetmetal	3					
37	0090-0419	Washer, Flat, 1/4 in.		2	2	2	2	2
38	B04-02-0002	T-Nut, 1/4-20	2	3	3	3	3	3
39	B07-10-1091	Bushing, Sleeve	1	1	1	1	1	1
40	B05-05-0007	Roller, Lower (includes item 39)	1	1	1	1	1	1
41	0090-0185	Nut, Nylon Lock, 5/16-18	1	1	1	1	1	1
42	0090-0922	Screw, Skt. Hd., Ctsk., 5/16-18 x 2-1/4 in.	1	1	1	1	1	1
43	0090-0185	Nut, Nylon Lock, 5/16-18	1	1	1	1	1	
44	0090-0420	Washer, Flat, 5/16	1	1	1	1	1	
45	B31-00-0031	Block, Slide	1	1	1	1	1	
46	B30-00-0045	Plate, Shim	1	1	1	1	1	1
47	B11-00-0043	Bar, Lifting	1	1	1	1	1	1
48	0090-0192	Nut, Nylon Lock, 1/2-13	2	2	2	2	2	2
49	0090-0169	Nut, Hex 1/2-13	2	2	2	2	2	2
50	B04-07-0109	Clevis, BL-466 Chain	2	2	2	2	2	
50	B04-07-0110	Clevis, BL-566 Chain						2
51	B04-07-0112	Pin, Clevis, with Cotter Pin, BL-466 Chain	2	2	2	2	2	
51	B04-07-0111	Pin, Clevis, with Cotter Pin, BL-566 Chain						2
52	B40-00-0022	Chain, BL-466	2	2	2	2	2	
52	B40-00-0023	Chain, BL-566						2
53	B04-02-0002	T-Nut, 1/4-20		1		1		1
54	0090-0419	Washer, Flat, 1/4		2		2		2
55	0090-0688	Bolt, 1/4-20 x 1 in.		1		1		1
56	B26-00-0019	Sheave, Cable		1		1		1
57	B25-00-0066	Spacer		1		1		1
58	0090-0921	Screw, Skt. Hd., Ctsk., 5/16-18 x 2-1/8 in.	1	1	1	1	1	
59	0089-158	Spring			1	1	1	1
60	0090-0183	Nut, Nylon Lock, 1/4-20			1	1	1	1

NOTE: Chain parts must be purchased as an assembly. Chain Assembly (Part Number B03-00-0142) for aluminum masts include: sheave mounting bracket, two BL-466 chains, two clevises, four clevis pins, four cotter pins, two hex nuts, and two lock nuts.

6-2 MAIN (WELDED) MAST PARTS LIST

Refer to Table 6-2 for the parts list for the main (welded) mast.

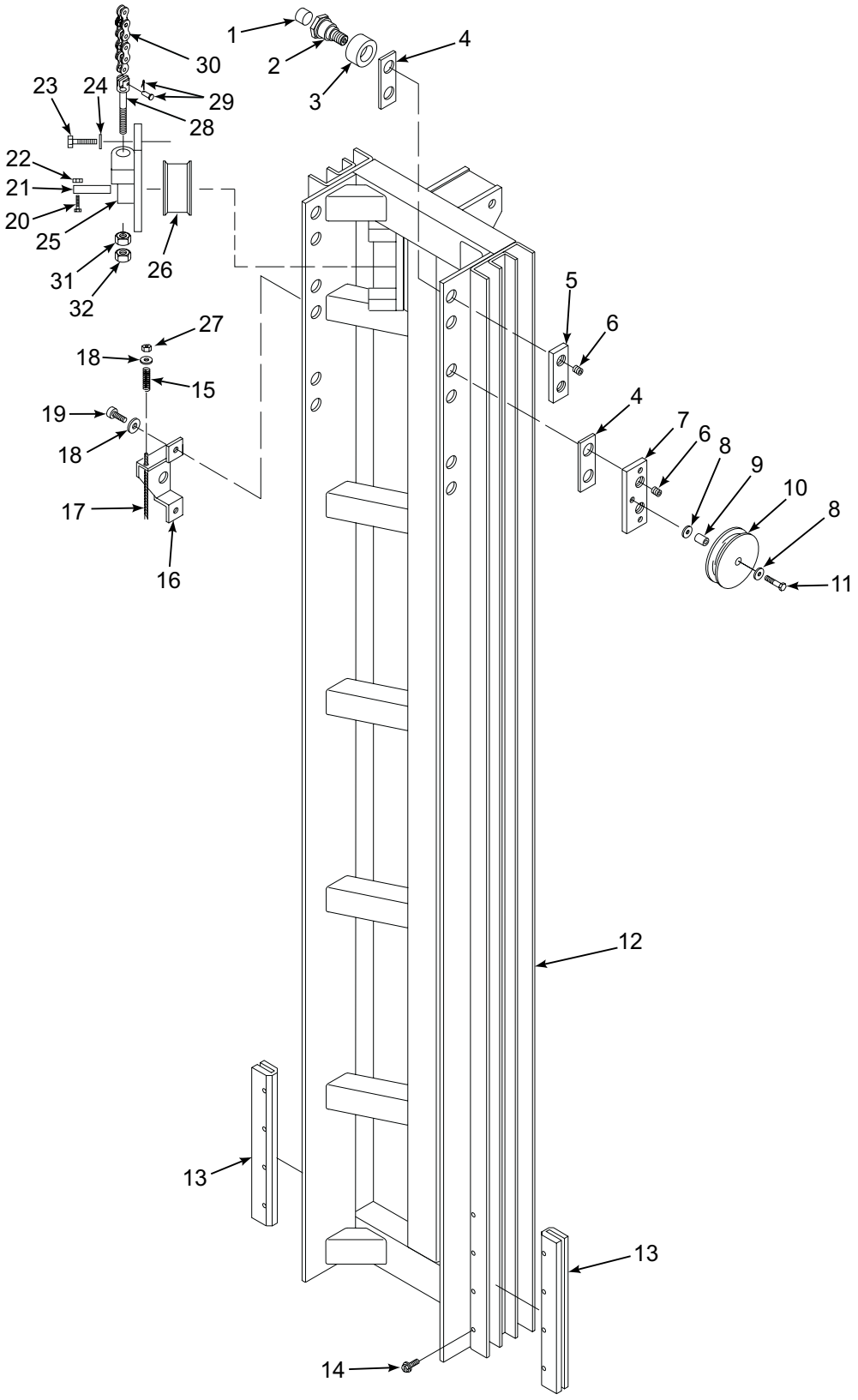


Figure 6-2. Main (Welded) Mast Exploded View

Table 6-2. Main (Welded) Mast Parts List

Item No.	Part No.	Description	Qty
1	B31-00-0030	Guide Peg	12
2	B04-07-0108	Axle Bolt, Roller	12
3	B05-05-0006	Roller	12
4	B07-06-5386	Plate, Clamping, Roller	8
5	B07-06-5387	Plate, Mounting, Roller	4
6	0090-0363	Screw, Set, 1/4-20 x 3/4 in.	12
7	B29-00-0138	Plate, Mounting, Bracket	2
8	0090-0419	Washer, Flat, 1/4 in.	2
9	B25-00-0066	Spacer	1
10	B26-00-0019	Sheave, Cable	1
11	0090-0688	Bolt, 1/4-20 x 1 in.	1
12	B16-00-0003	Mast, Welded	1
13	B31-00-0033	Block, Slide	4
14	0090-0472	Screw, 10 x 1/2 in. Sheetmetal	16
15	0089-158	Spring	1
16	B07-06-5437	Bracket, Cable	1
17	B40-00-0024	Cable	1
18	0090-0419	Washer, Flat, 1/4 in.	5
19	0090-0001	Screw, 1/4-20 x 1/2 in.	2
20	0090-0702	Bolt, 10-24 x 2 in., Machine	2
21	B36-01-0026	Axle, 3/4 in., Sheave	2
22	0090-0182	Nut, Nylon Lock, 10-24	2
23	0090-0066	Bolt, 1/2-13 x 1-1/4 in.	4
24	0090-0212	Washer, Lock, 1/2 in.	4
25	B11-00-0044	Bracket, Right Side	1
25	B11-00-0045	Bracket, Left Side	1
26	B26-00-0022	Sheave with Bushing, 3 in.	2
27	0090-0183	Nut, Nylon Lock, 1/4-20	1
28	B04-07-0109	Clevis, BL-466 Chain	2
29	B04-07-0112	Pin, Clevis, with Cotter Pin, BL-466 Chain	2
30	B40-00-0022	Chain, BL-466	2
31	0090-0169	Nut, Hex, 1/2-13	2
32	0090-0192	Nut, Nylon Lock, 1/2-13	2

NOTE: Chain parts must be purchased as an assembly. Chain Assembly (Part Number B03-00-0141) for main (welded) mast includes: BL-466 chain, clevises on both ends, two clevis pins, two cotter pins, two hex nuts, and two lock nuts.

6-3 MAST CYLINDER AND SLIDE BLOCKS PARTS LIST

Refer to Table 6-3 for the parts list for the mast cylinder and slide blocks.

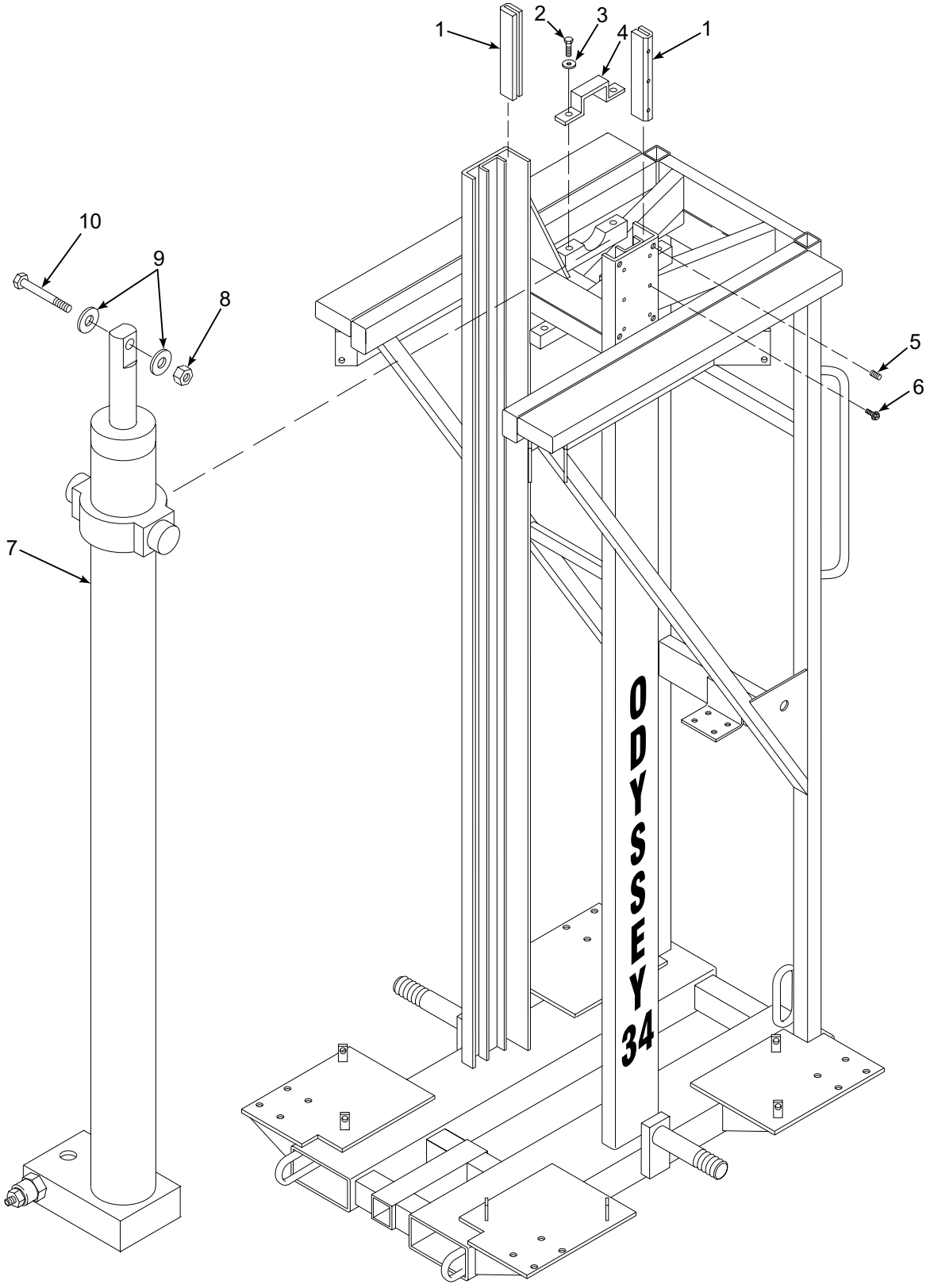


Figure 6-3. Mast Cylinder and Slide Blocks Exploded View

Table 6-3. Mast Cylinder and Slide Blocks Parts List

Item No.	Part No.	Description	Qty
1	B31-00-0032	Block, Slide	4
2	0090-0042	Bolt, 3/8-16 x 1 in.	4
3	0090-0210	Washer, Lock, 3/8 in.	4
4	B07-06-5414	Bracket, Cylinder	2
5	0090-0389	Screw, Set, 1/4-20 x 1/2 in.	8
6	0090-0403	Screw, 10 x 1 in. Sheetmetal	12
7	B02-03-0019	Cylinder, Hydraulic	1
8	0090-0192	Nut, Nylon Lock, 1/2-13	1
9	0090-0574	Washer, Flat, 1/2 in.	2
10	0090-0080	Bolt, 1/2-13 x 4-1/2 in.	1

6-4 POWER UNIT AND CONTROLS PARTS LIST

Refer to Table 6-4 for the parts list for power unit and controls.

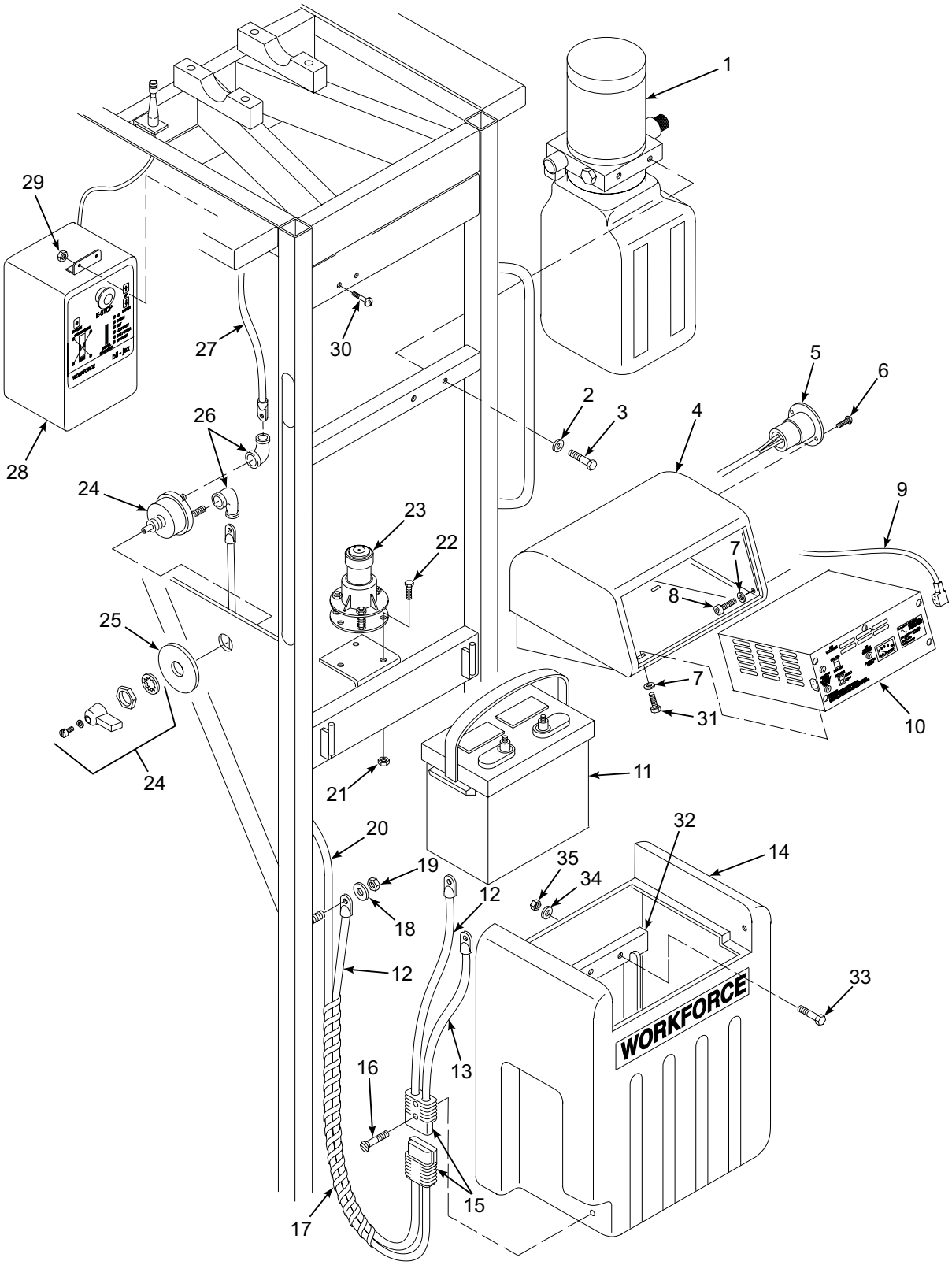


Figure 6-4. Power Unit and Controls Exploded View

Table 6-4. Power Unit and Controls Parts List

Item No.	Part No.	Description	Qty
1	B02-05-0025	Pump, Hydraulic	1
2	0090-0210	Washer, Lock, 3/8 in.	2
3	0090-0045	Bolt, 3/8-16 x 1-1/2 in.	2
4	B18-00-0138	Enclosure, Charger	1
5	B01-10-0003	Receptacle, Flush Mount	1
6	0090-0225	Screw 8-32 x 1/2 in.	2
7	0090-0419	Washer, Flat, 1/4 in.	6
8	0090-0929	Screw, Socket Head, 1/4-20 x 3/4 in.	2
9	B01-10-0162	Cable, Charger	1
10	B01-05-0009	Charger	1
11	B01-04-0002	Battery, 27 DCM	1
12	B01-01-0038	Cable, Battery, 22 in.	2
13	B01-01-0037	Cable, Battery, 16 in.	1
14	B18-00-0137	Enclosure, Battery	1
15	B01-09-0031	Plug, Connector	2
16	0090-0829	Screw, Slotted Hd., Ctsk., 1/4-20 x 1-1/4 in.	2
17	B05-04-0001	Spiral Wrap	1-1/2 foot
18	0090-0210	Washer, Lock, 3/8 in.	1
19	0090-0162	Nut, 3/8-16	1
20	B01-00-0036	Cable, Battery, 33 in.	1
21	0090-0183	Nut, Nylon Lock, 1/4-20	3
22	0090-0005	Bolt, 1/4-20 x 3/4 in.	3
23	B01-10-0135	Sensor, Level	1
24	B01-02-0060	Switch, Master Power	1
25	B00-00-0112	Face Plate, Master Power Switch	1
26	B01-09-0018	Boot, Rubber	3
27	B01-01-0028	Cable, 33 in.	1
28	B01-10-0170	Control, Lower (Refer to Table 6-10 for Parts Breakdown)	1
29	0090-0182	Nut, Nylon Lock, 10-24	4
30	0090-0239	Screw, 10-24 x 1-1/2 in.	4
31	0090-0005	Screw, 1/4-20 x 3/4 in.	4
32	B07-10-5271	Support, Battery Box	1
33	0090-0032	Bolt, 5/16-18 x 1-1/2 in.	2
34	0090-0420	Washer, Flat, 5/16 in.	2
35	0090-0185	Nut, Nylon Lock, 5/16-18	2

6-5 MAIN FRAME AND OUTRIGGERS PARTS LIST

Refer to Table 6-5 for the parts list for the main frame and outriggers.

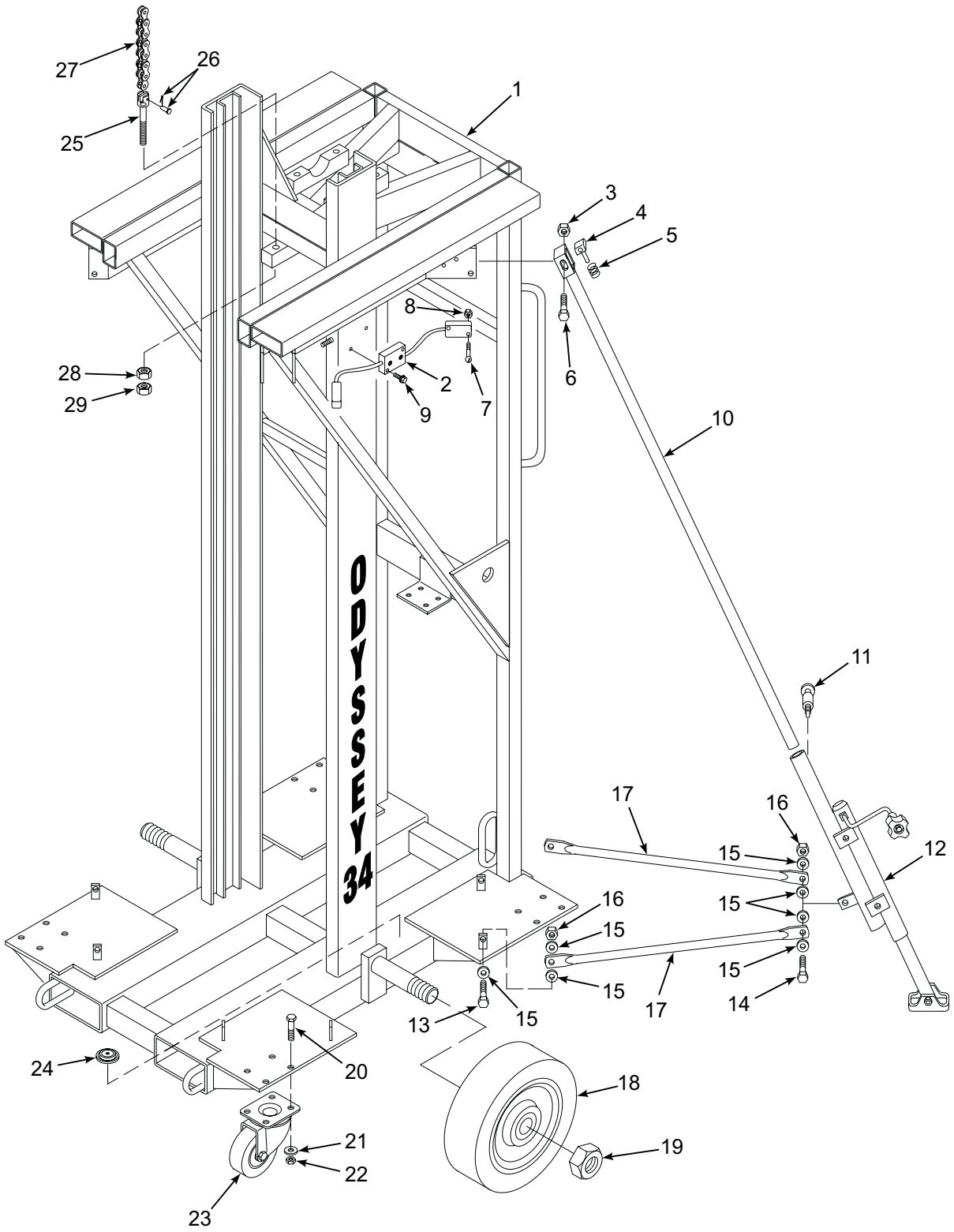


Figure 6-5. Main Frame and Outriggers Exploded View

Table 6-5. Main Frame and Outriggers Parts List

Item No.	Part No.	Description	Qty
1	B11-01-0091	Frame Weldment, Main	1
2	B01-03-0042	Switch and LED Assembly	2
3	0090-0191	Nut, Jam, Nylon Lock, 1/2-13	4
4	B23-00-0004	Guide, Spring	4
5	B39-00-0039	Spring	4
6	0090-0923	Capscrew, 1/2-13 x 3-1/4 in.	4
7	0090-0737	Screw, 10-24 x 1-1/4 in.	8
8	0090-0182	Nut, Nylon Lock, 10-24	8
9	0090-0346	Screw, 10-24 x 3/4 in., Threadcutting	4
10	B23-01-0095	Outrigger	4
11	B36-00-0038	Pin, Outrigger	4
12	B23-02-0050	Jack-Left Rear, Right Front	2
12	B23-02-0051	Jack-Right Rear, Left Front	2
13	0090-0067	Bolt, 1/2-13 x 1-1/2 in.	8
14	0090-0068	Bolt, 1/2-13 x 1-3/4 in.	4
15	0090-0574	Washer, Flat, 1/2 in.	40
16	0090-0192	Nut, Nylon Lock, 1/2-13	12
17	B28-00-0009	Brace, Outrigger	8
18	B08-00-0017	Wheel	2
19	0090-0889	Nut, Nylon Lock, 1-1/4 - 7	2
20	0090-0028	Bolt, 5/16-18 x 3/4 in.	16
21	0090-0208	Washer, Lock. 5/16 in.	16
22	0090-0160	Nut, 5/16-18	16
23	B08-01-0020	Caster	4
24	B00-00-0001	Level, Bubble	2
25	B04-07-0110	Clevis, BL-566 Chain	2
26	B04-07-0111	Pin, Clevis, with Cotter Pin, BL-566 Chain	2
27	B40-00-0023	Chain, BL-566	2
28	0090-0169	Nut, Hex, 1/2-13	2
29	0090-0192	Nut, Nylon Lock, 1/2-13	2

NOTE: Chain parts must be purchased as an assembly. Chain Assembly (Part Number B03-00-0140) for main frame includes BL-566 chain, clevises on both ends, two clevis pins, two cotter pins, two hex nuts, and two lock nuts.

6-6 PLATFORM PARTS LIST

Refer to Table 6-6 for the parts list for the platform.

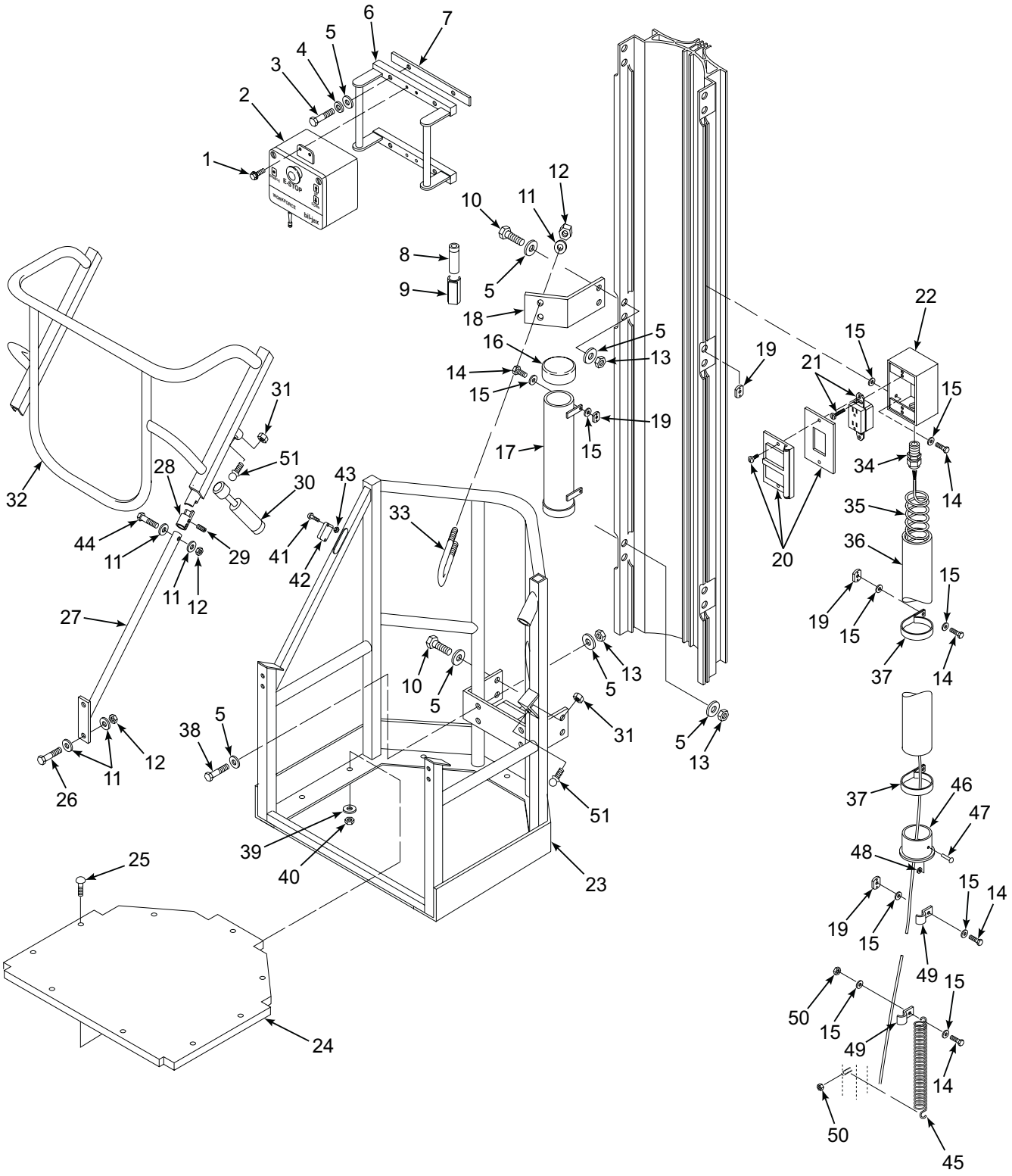


Figure 6-6. Platform Exploded View

Table 6-6. Platform Parts List

Item No.	Part No.	Description	Qty
1	0090-0344	Screw, Thread Cutting, 10-24 x 1/2 in.	4
2	B01-10-0169	Control Box, Upper (Refer to Table 6-9 for Parts Breakdown)	1
3	0090-0046	Bolt, 3/8-16 x 1-3/4 in.	4
4	0090-0210	Washer, Lock, 3/8 in.	4
5	0090-0422	Washer, Flat, 3/8 in.	28
6	B29-00-0140	Bracket, Upper Control Box	1
7	B07-06-5426	Bar, Bracket	2
8	B01-10-0166	Pointer, Laser	1
9	B01-10-0164	Mount, Laser	1
10	0090-0043	Bolt, 3/8-16 x 1-1/4 in.	8
11	0090-0420	Washer, Flat, 5/16 in.	10
12	0090-0185	Nut, Nylon Lock, 5/16-18	7
13	0090-0162	Nut, Nylon Lock, 3/8-16	12
14	0090-0001	Bolt, 1/4-20 x 1/2 in.	7
15	0090-0419	Washer, Flat, 1/4 in.	6
16	B00-00-0014	Cap, Manual Tube	2
17	B11-00-0049	Tube, Manual	1
18	B07-06-5419	Bracket, Platform	2
19	B04-02-0002	T-Nut, 1/4-20	6
20	B01-10-0035	Cover, GFI	1
21	B01-10-0034	Receptacle, GFI	1
22	B01-10-0046	Box, Electrical	1
23	B17-00-0095	Platform	1
24	B44-00-0031	Floor, Platform	1
25	0090-0638	Bolt, Carriage, 5/16-18 x 1-1/2 in.	9
26	0090-0036	Bolt, 5/16-18 x 2-1/4 in.	2
27	B29-00-0137	Support, Gate	1
28	B07-10-1108	Lock, Gate	1
29	0090-0930	Screw, Set, 5/16-18 x 5/16 in.	2
30	B39-00-0034	Gas Shock	1
31	0090-0160	Nut, Plain Hex, 5/16-18	2
32	B17-00-0091	Gate	1
33	0090-0662	U-Bolt, 5/16-18	2
34	B01-09-0029	Grip, Cord	1
35	B01-01-0126	Cord, Retractable	1
36	B00-00-0120	Tube, Plastic	1
37	B29-00-0139	Clamp, Tube (Attached to 5th Mast)	2
38	0090-0048	Bolt, 3/8-16 x 2 in.	4
39	0090-0208	Washer, Lock, 5/16 in.	9
40	0090-0160	Nut, Plain Hex, 5/16-18	9
41	0090-0238	Screw, Machine, 10-24 x 1 in.	2
42	B01-03-0041	Switch, Proximity	2
43	0090-0182	Nut, Nylon Lock, 10-24	2
44	0090-0034	Bolt, 5/16-18 x 2 in.	1
45	B39-00-0037	Spring (Attached to Stud on Main Frame)	1
46	B00-00-0008	Plug, Plastic	1
47	0090-0684	Rivet, Pop, 3/16 x 1/2 in.	2
48	0090-0498	Washer, Flat, 3/16 in.	2
49	B04-07-0031	Clamp, Cable, DG-5	2
50	0090-0183	Nut, Nylon Lock, 1/4-20	2
51	0090-0920	Stud, Ball	2

6-7 COVERS PARTS LIST

Refer to Table 6-7 for the parts list for the cover.

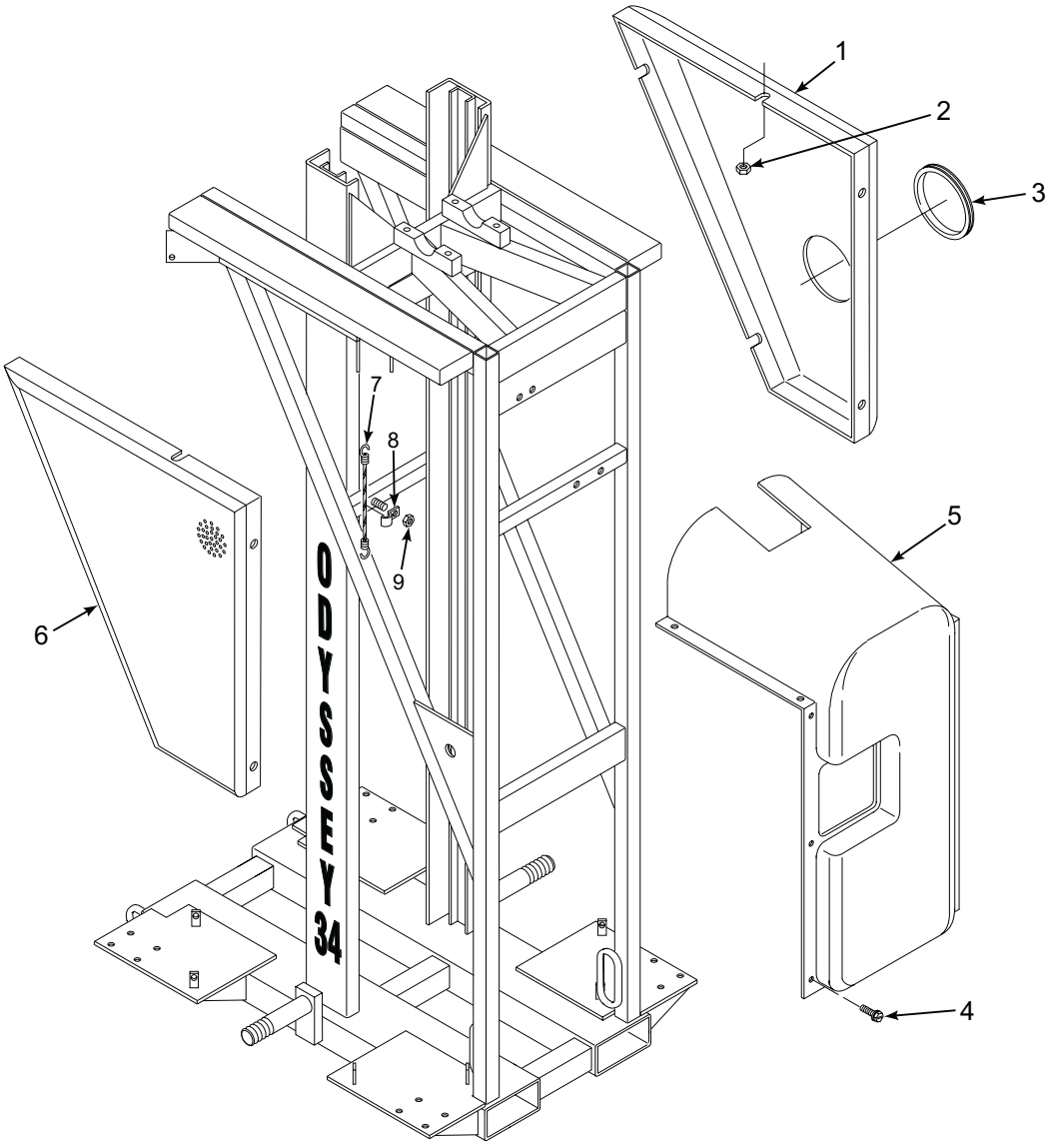


Figure 6-7. Covers Exploded View

Table 6-7. Covers Parts List

Item No.	Part No.	Description	Qty
1	B18-00-0142	Cover, Right	1
2	0090-0159	Nut, 1/4-20	10
3	B34-00-0006	Trimlok, 1/8 in.	1
4	0090-0344	Screw, Thread Cutting, 10-24 x 1/2 in.	10
5	B18-00-0140	Cover, Back	1
6	B18-00-0141	Cover, Left	1
7	B05-000-0028	Cord, Outrigger Tie-Down	2
8	B04-07-0032	Clamp, Cable, DG-6	2
9	0090-0183	Nut, Nylon Lock, 1/4-20	2

6-8 JACK ASSEMBLY PARTS LIST

Refer to Table 6-8 for the parts list for the jack assembly.

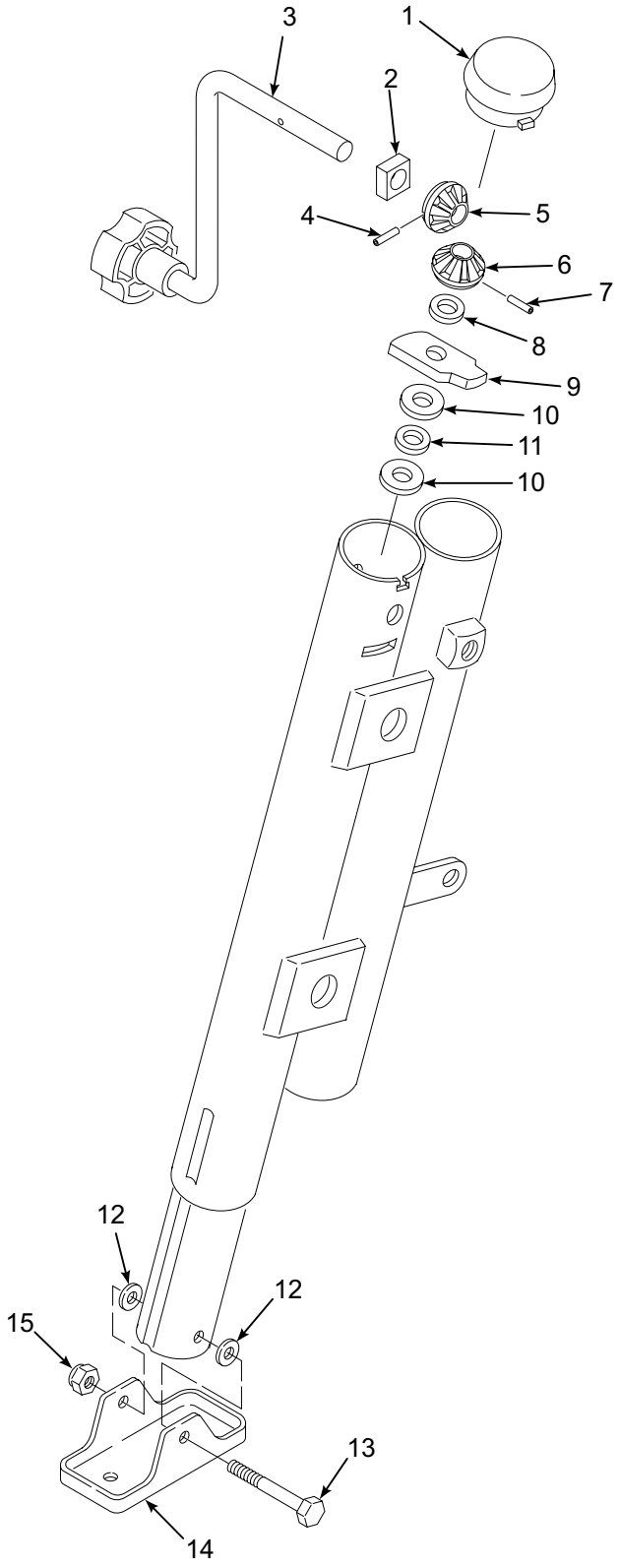


Figure 6-8. Jack Assembly Exploded View

Table 6-8. Jack Assembly Parts List

Item No.	Part No.	Description	Qty
1	B00-00-0123	Cap, Plastic	1
	B46-00-0030	Handle Kit	1
2		Bushing	1
3		Handle	1
4		Groove Pin	1
	B22-00-0012	Bevel Gear Kit	1
2		Bushing	1
4		Groove Pin	1
5		Bevel Gear, Vertical	1
6		Bevel Gear, Horizontal	1
7		Dowel Pin	1
8		Washer, 0.53 ID x 1.06 OD	1
	B22-00-0013	Support Plate Kit	1
8		Washer, 0.53 ID x 1.06 OD	1
9		Support Plate	1
10		Washer	2
11		Washer, Thrust	1
12	0090-0422	Washer, Flat, 3/8 in.	2
13	0090-0050	Bolt, 3/8-16 x 2-1/2 in.	1
14	B23-02-0054	Footpad	1
15	0090-0623	Nut, Jam, Nylon Lock, 3/8-16	1

6-9 UPPER CONTROL (B01-10-0169) PARTS LIST

Refer to Table 6-9 for the parts list for the upper control (Transmitter).

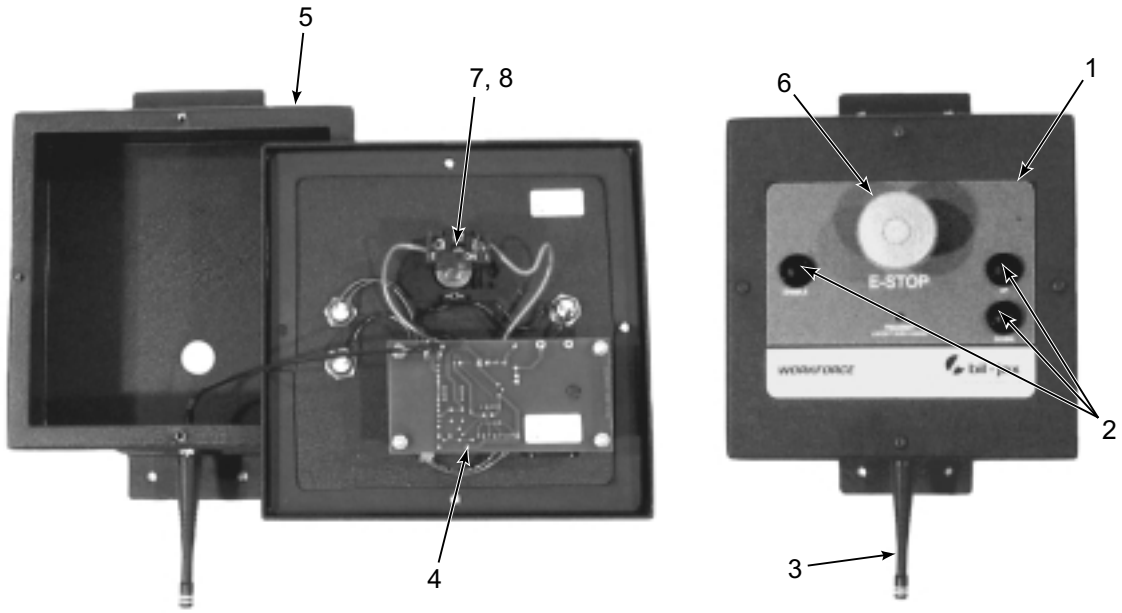


Figure 6-9. Upper Control (Transmitter)

Table 6-9. Upper Control (Transmitter) Parts List

Item No.	Part No.	Description	Qty
1	B06-00-0370	Label, Upper	1
2	B01-10-0178	Pushbutton, Black	3
3	B01-10-0177	Antenna, 3 in.	1
4	B01-10-0171	PCBoard, Transmitter	1
5	B01-10-0174	Enclosure, Control, Upper	1
6	B01-02-0031	Emergency Stop Button	1
7	B01-02-0032	NC Contact, Emergency Stop Button	1
8	B01-10-0055	Mount Collar, Emergency Stop Button	1

NOTE: To order both an Upper Control (Transmitter) and Lower Control (Receiver) specify Part Number B01-10-0168 Transmitter/Receiver.

6-10 LOWER CONTROL (B01-10-0170) PARTS LIST

Refer to Table 6-10 for the parts list for the lower control (Receiver).

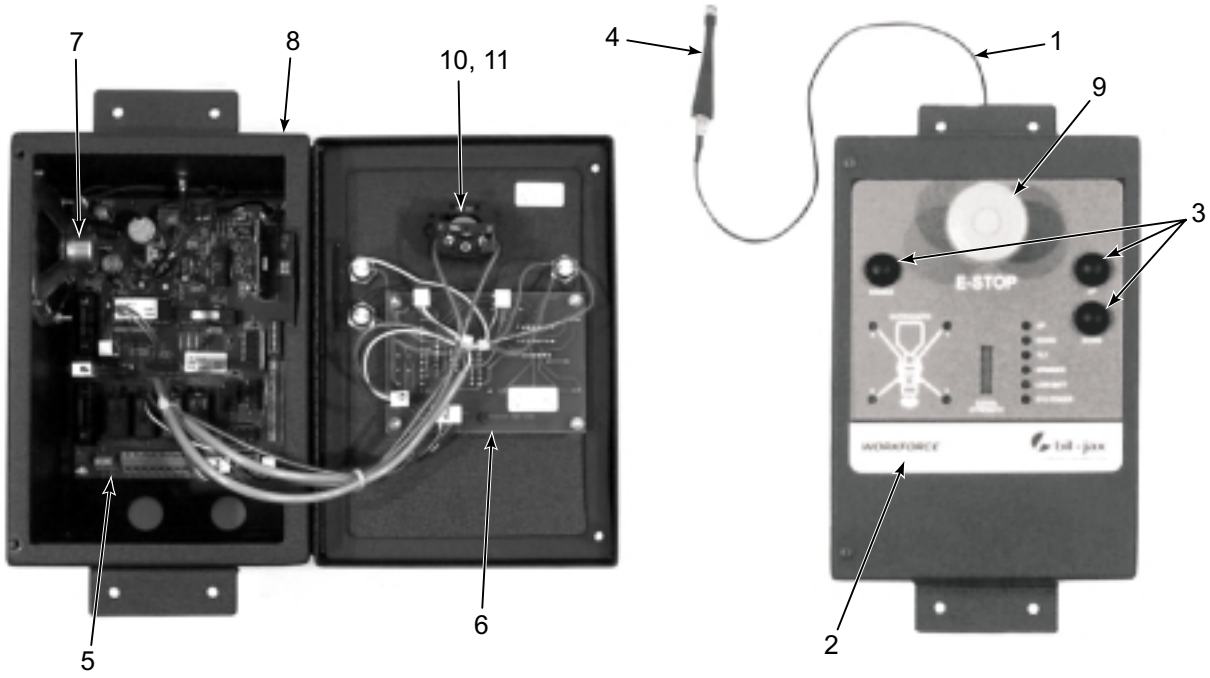


Figure 6-10. Lower Control (Receiver)

Table 6-10. Lower Control (Receiver) Parts List

Item No.	Part No.	Description	Qty
1	B01-01-0125	Cable, Extender, 18 in.	1
2	B06-00-0369	Label, Lower	1
3	B01-10-0178	Pushbutton, Black	3
4	B01-10-0177	Antenna, 3 in.	1
5	B01-10-0172	Board, Receiver	1
6	B01-10-0173	Board, LED	1
7	B01-10-0176	Speaker	1
8	B01-10-0175	Enclosure, Control, Lower	1
9	B01-02-0031	Emergency Stop Button	1
10	B01-02-0032	NC Contact, Emergency Stop Button	1
11	B01-10-0055	Mount Collar, Emergency Stop Button	1

NOTE: To order both an Upper Control (Transmitter) and Lower Control (Receiver) specify Part Number B01-10-0168 Transmitter/Receiver.

6-11 HYDRAULIC UNIT PARTS LIST

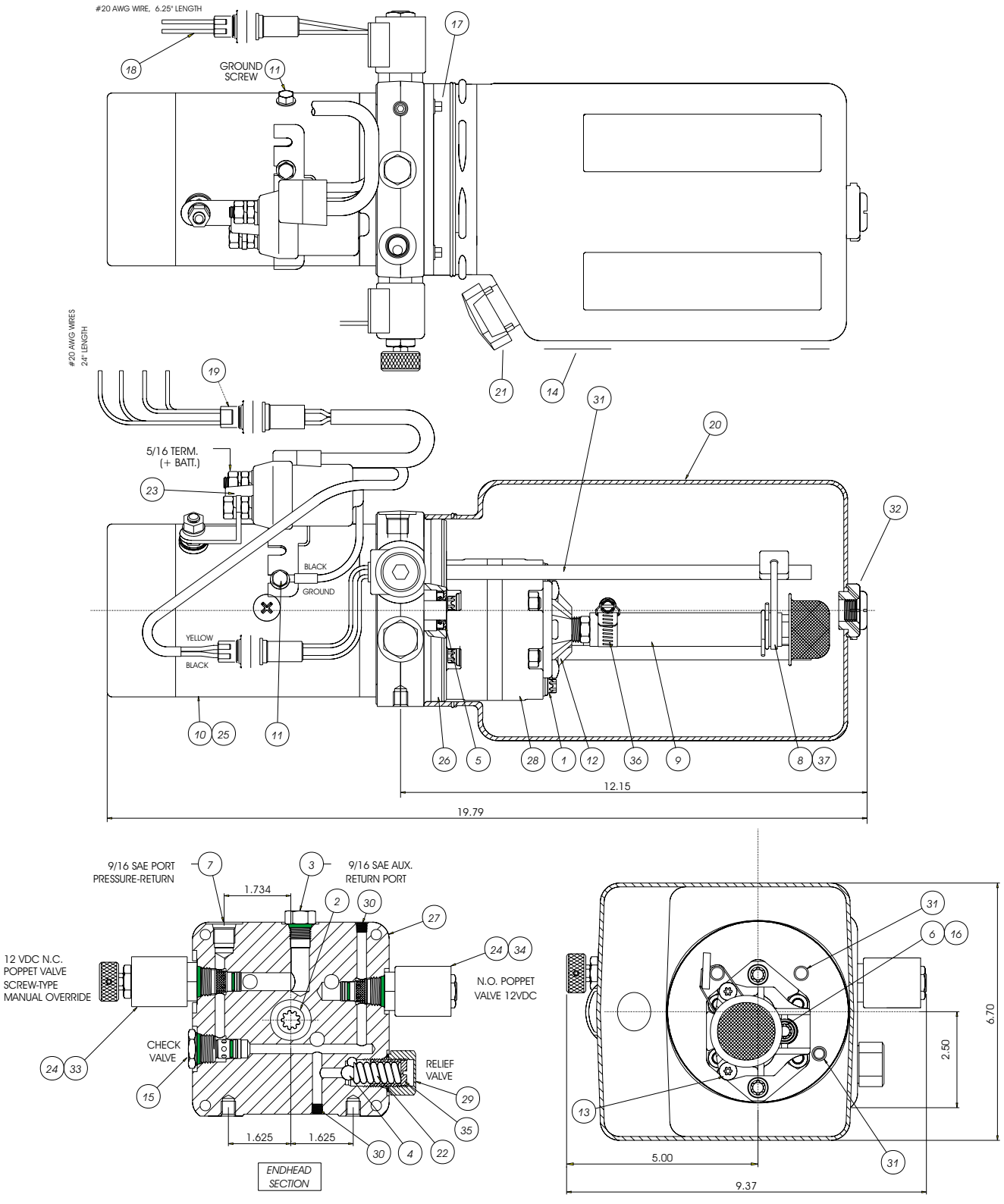


Figure 6-11. Hydraulic Unit Assembly

Table 6-11. Hydraulic Unit Parts List

Item No.	Part No.	Description	Qty
1	B02-15-0089	Bolt, 5/16 x 3 in., Gr 8 Hex	2
2	B02-15-0119	Coupling, SAE 9T 020/40	1
3	B02-02-0087	Plug, #6 ORM	1
4	B02-15-0128	Ball, Steel, 3/8 in.	1
5	B02-15-0091	Seal, Shaft	1
6	B02-15-0093	Washer, 0.338 x 0.625 x 0.060 in.	1
8	B02-15-0061	Magnet, Plumbing	1
9	B02-15-0368	Plumbing Assembly	1
10	B02-15-0122	Motor, 12 VDC, Standard Duty	1
11	B02-15-0123	Screw, Taptite, 1/4-20 x 1/4 Hex	3
12	B02-15-0371	Cover Assembly, Suction	1
13	B02-15-0126	Screw, Taptite, M6 x 1.0 x 12mm, Torx	2
14	No Replacement	Serial Tag, Hydraulic Unit	1
15	B02-15-0197	Valve, Cartridge Check	1
16	B02-15-0170	Bolt, 5/16-18 x 1 in., Torx	1
17	B02-15-0199	Bolt, 12-24 x 1/2 in.	4
18	B02-15-0348	Wire Assembly, 2 Pin 6 in.	1
19	B02-15-0367	Wire Assembly, 4 Pin 24 in.	1
20	B02-15-0369	Tank, Plastic, 1.5 Gallon, Vertical	1
21	B02-15-0201	Cap, Breather, w/Check Valve	1
22	B02-15-0127	Spring, Relief	1
23	B02-15-0345	Solenoid, Motor Start	1
24	B02-15-0349	Coil, 12 VDC, w/2 Pin Plug	1
25	B02-15-0114	Pin, 1/8 x 1/4 in.	1
26	B02-15-0073	O-Ring, Reservoir	1
27	B02-15-0203	Head, End	1
28	B02-15-0079	Pump Assembly, 2.5 GPM	1
29	B02-15-0030	Cap Assembly, Relief	1
30	B02-15-0204	Plug, 1/16 NPT	2
31	B02-15-0370	Tube, Return, 3/8 x 10 in.	3
32	B02-15-0365	Plug, Drain, 9/16 SAE	1
33	B02-15-0350	Valve, 2-Way, NC w/Manual Override	1
34	B02-15-0351	Valve, 2-Way NO	1
35	B02-15-0026	Screw, Adjusting for Relief	1
36	B02-15-0372	Clamp, Hose	1
37	B01-09-0030	Cable Tie, 7 in.	1

6-12 HYDRAULIC SYSTEM SCHEMATIC DIAGRAM

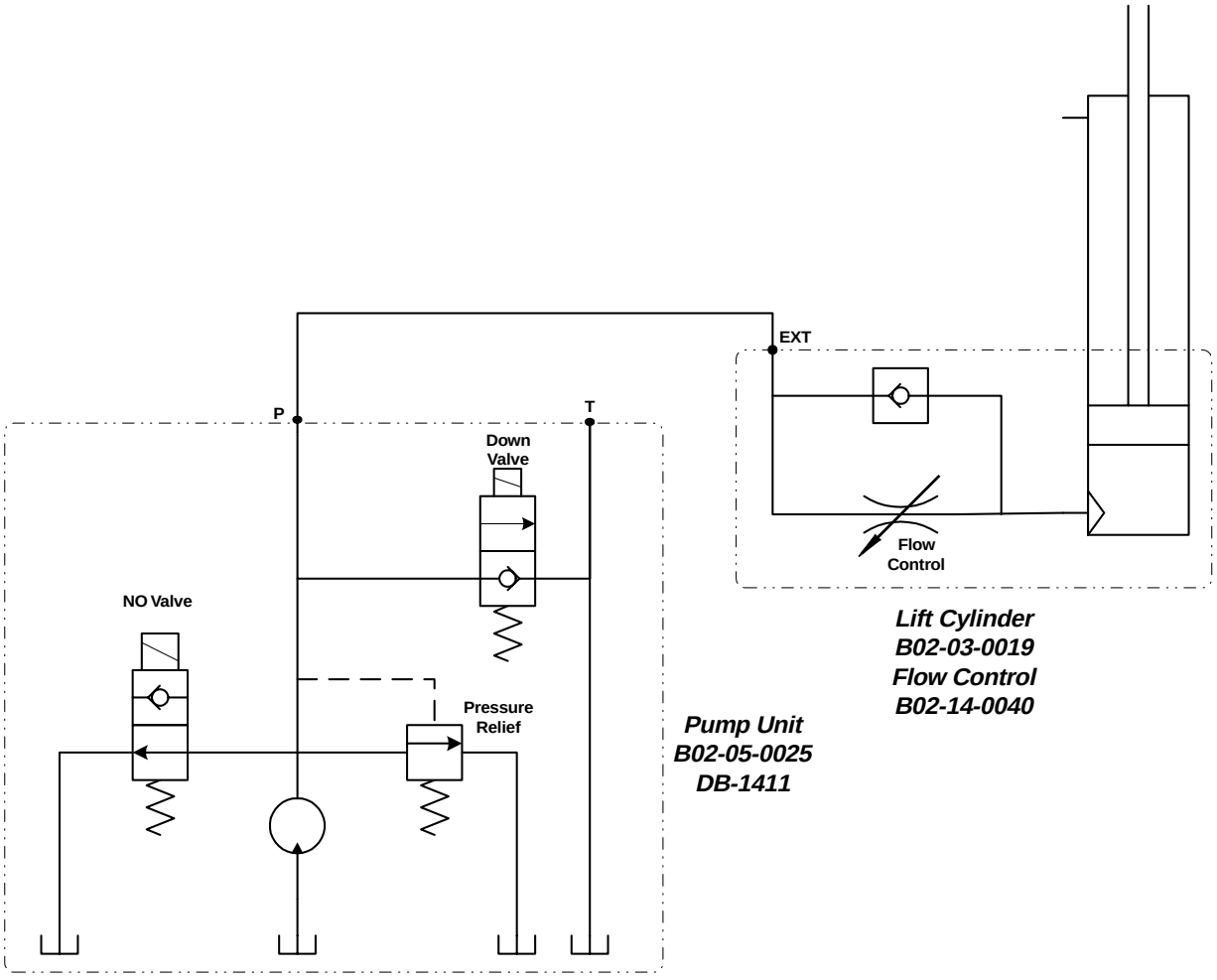


Figure 6-12. Hydraulic System Schematic Diagram

6-13 ELECTRICAL SCHEMATIC

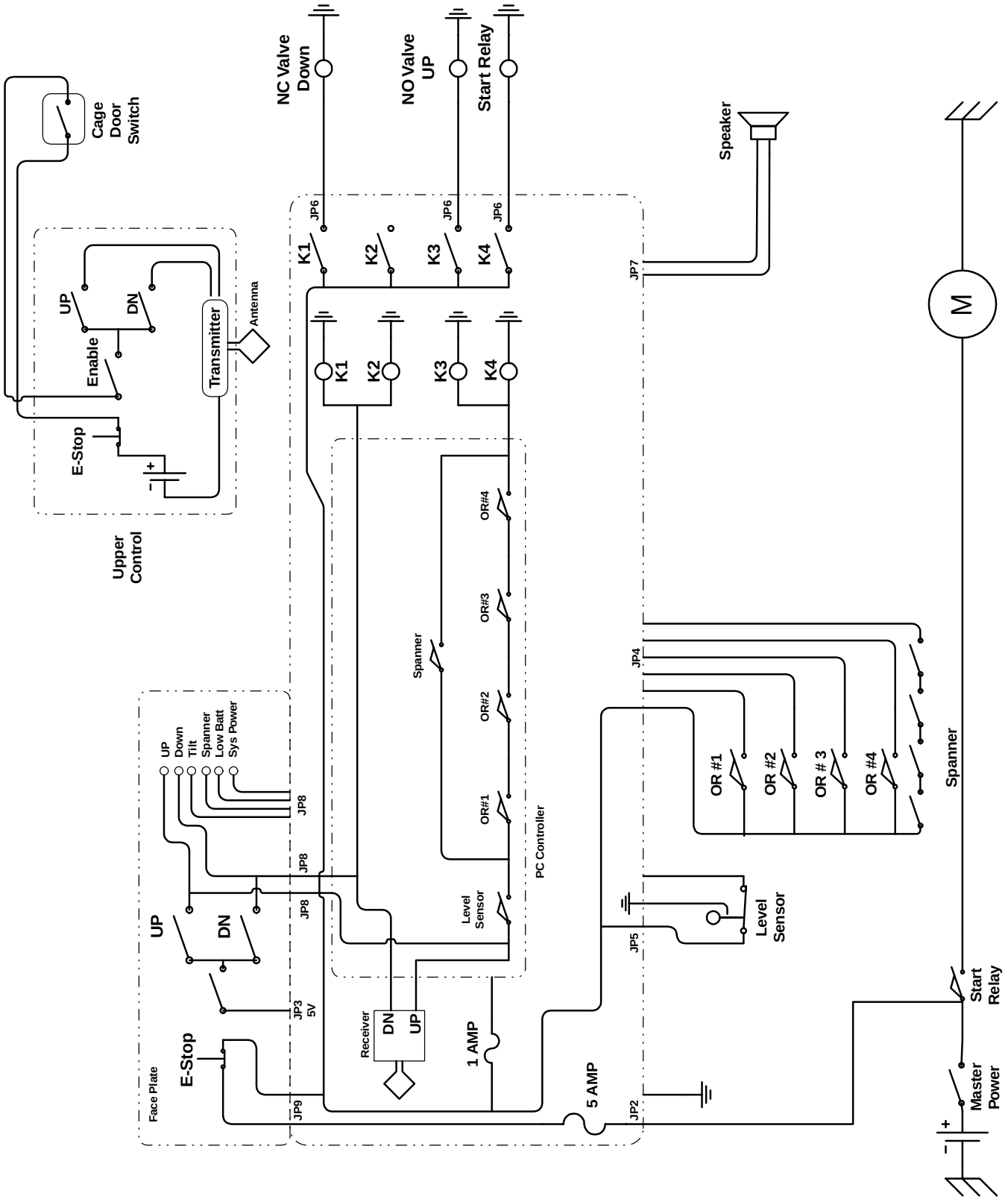


Figure 6-13. Electrical Schematic

6-14 ELECTRICAL LAYOUT

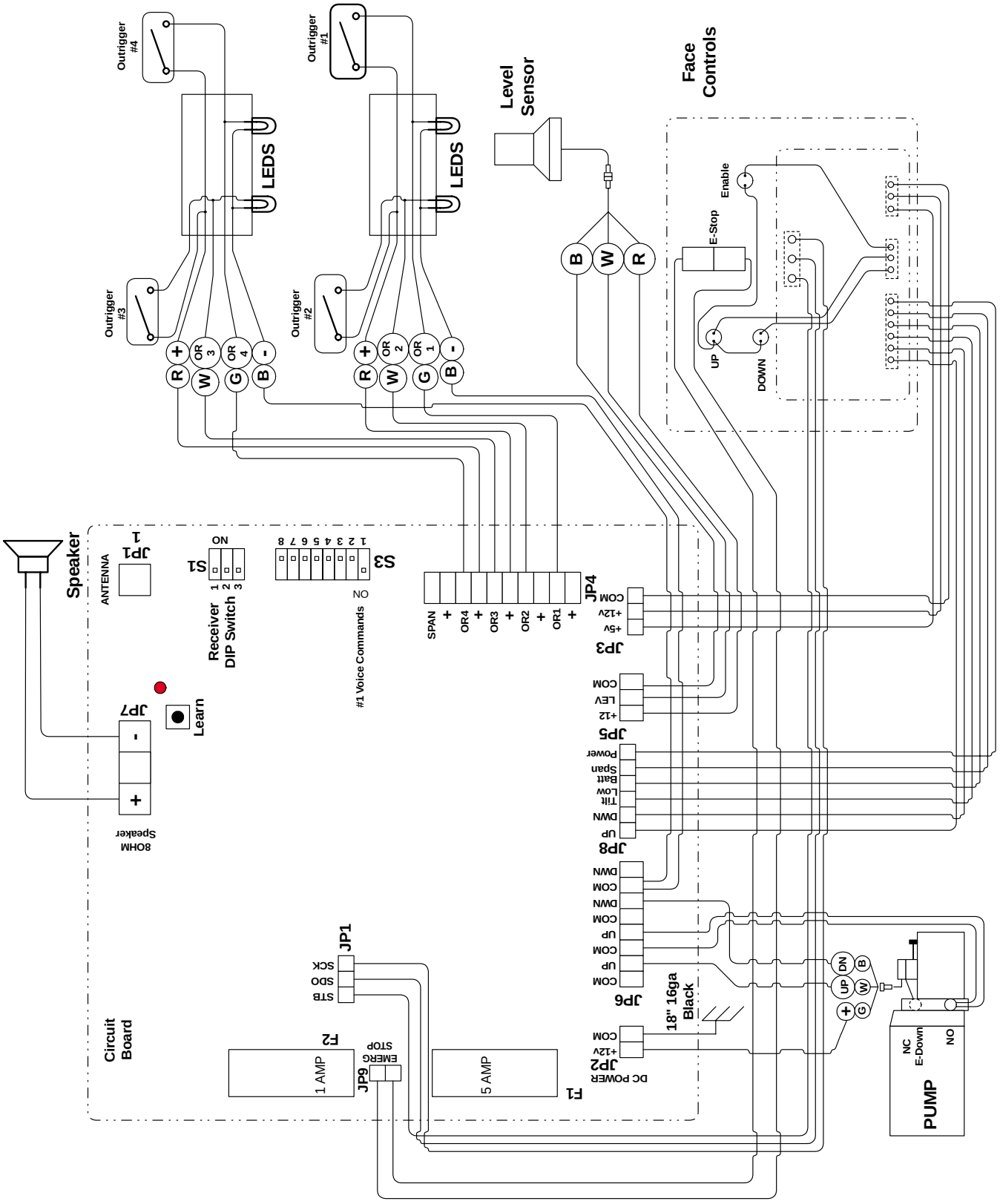


Figure 6-14. Electrical Layout

7
ANSI Reprint

The following sections are reprinted from the ANSI A92.3-1990 code in effect at the time of manufacture. Permission to reprint has been granted by the Scaffold Industry Association.

5. Responsibilities of Dealers

5.1 Basic Principles. Sound principles of safety, training, inspection, maintenance, applications, and operation consistent with all data available regarding the parameters intended use and expected environment shall be applied in the training of operators, in maintenance, application, and operation of the aerial platform with due consideration of the knowledge that the unit will be carrying personnel.

5.2 Manuals. Dealers shall keep and maintain copy(ies) of the operating and maintenance manual(s) required in 4.17. Copy(ies) of operating manual(s) shall be provided upon each rental or lease delivery. Copy(ies) of operating and maintenance manual(s) shall be provided upon each sale delivery. The operating manual(s) shall be stored in the location required by 4.18. These manual(s) are considered an integral part of the aerial platform and are vital to communicate necessary safety information to users and operators.

5.3 Predelivery Preparation. Aerial platforms shall be inspected, serviced, and adjusted to manufacturer's requirements prior to each delivery by sale, lease, or rental.

5.4 Maintenance Safety Precautions. Before adjustments and repairs are started on an aerial platform, the following precautions shall be taken as applicable: (1) All controls in the "off" position and all operating features secured from inadvertent motion by brakes, blocks, or other means. (2) Powerplant stopped and starting means rendered inoperative (3) Platform lowered to the full down position, if possible, or otherwise secured by blocking or cribbing to prevent dropping (4) Hydraulic oil pressure relieved from all hydraulic circuits before loosening or removing hydraulic components (5) Safety props or latches installed where applicable as described by the manufacturer.

5.5 Replacement Parts. When parts or components are replaced, they shall be identical or equivalent to original aerial platform parts or components

5.6 Training. Whenever a dealer directs or authorizes an individual to operate an aerial platform, the dealer shall ensure that the individual has been trained under the direction of a qualified person in accordance with the manufacturer's operating and maintenance manual and requirements listed in Section 8 before operating the aerial platform.

5.6.1 Training on Delivery. Manufacturer's operating instruction and required training on the proper use and operation of the aerial platform shall be provided upon each delivery, by sale, lease, or rental.

5.7 Operation. When a dealer operates an aerial platform in sales demonstrations or for other beneficial use, the dealer shall assume the responsibilities of users as specified in Section 7 and the operating personnel shall assume the responsibilities of operators as specified in Section 8 of this standard.

5.8 Assistance to Owners and Users. If a dealer is unable to answer an owner's or user's question relating to rated capacity, intended use, maintenance, repair, inspection, or operation of the aerial platform, the dealer shall obtain the proper information from the manufacturer and provide that information to the owner or user.

5.9 Record Retention. Dealer(s) shall retain the following records for at least 3 years: (1) Name and address of the purchaser of each aerial platform by serial number and the date of delivery (2) Records of the person(s) trained upon each delivery of an aerial platform (3) Records of the predelivery preparation performed prior to each delivery.

5.10 Modifications. Modifications or alterations of aerial platforms shall be made only with prior written permission of the manufacturer.

5.11 Manufacturer's Safety Bulletins. The dealer shall comply with safety-related bulletins as received from the manufacturer.

6. Responsibilities of Owners

6.1 Basic Principles. Sound principles of safety, training, inspection, maintenance, application, and operation consistent with all data available regarding the parameters of intended use and expected environment shall be applied in the performance of the responsibilities of owners with due consideration of knowledge that the unit will be carrying personnel.

6.2 Manuals. Owners shall keep and maintain copy(ies) of the operating and maintenance manual(s) required in 4.17 of this standard. Copy(ies) of operating manual(s) shall be provided upon each rental or lease delivery. Copy(ies) of operating and maintenance manuals(s) shall be provided upon each sale delivery. The operating manual(s) shall be stored in the location required in 4.18 of this standard. These manual(s) are considered an integral part of the aerial platform and are vital to communicate necessary safety information to users and operators.

6.3 Maintenance. The owner of an aerial platform shall arrange that the maintenance specified in this standard is properly performed on a timely basis. The owner shall establish a preventive maintenance program in accordance with the manufacturer's recommendations and based on the environment and severity of use of the aerial platform. The owner shall arrange that frequent and annual inspections are performed. All malfunctions and problems noted shall be corrected before the aerial platform is returned to service.

6.4 Frequent Inspection. The owner of an aerial platform shall cause a frequent inspection to be performed on an aerial platform: (1) That has been in service for 3 months or 150 hours, whichever comes first (2) That has been out of service for a period longer than 3 months.

The inspection shall be made by a person qualified as a mechanic on the specific make and model of the aerial platform. The inspection shall include all items specified by the manufacturer for a frequent inspection and shall include, but not be limited to, the following: (3) All functions and their controls for speed(s), smoothness, and limits of motion (4) Emergency lowering means (5) All chain and cable mechanisms for adjustment and worn or damaged parts (6) All emergency and safety devices (7) Lubrication of all moving parts, inspection of filter element(s), hydraulic oil, engine oil, and coolant, as specified by the manufacturer (8) Visual inspection of structural components and other critical components, such as fasteners, pins, shafts, and locking devices (9) Placards, warnings, and control markings (10) Items specified by the manufacturer (11) Correction of all malfunctions and problems identified and further inspection, if necessary.

6.5 Annual Inspection. The owner of an aerial platform shall cause an annual inspection to be performed on the aerial platform no later than 13 months from the date of the prior annual inspection. The inspection shall be made by a person qualified as a mechanic on the specific make and model of the aerial platform. The inspection shall include all items specified by the manufacturer for an annual inspection.

6.6 Maintenance Safety Precautions. Before adjustments and repairs are started on an aerial platform, the following precautions shall be taken as applicable: (1) All controls in the "off" position and all operating features secured from inadvertent motion by brakes, blocks, or other means (2) Powerplant stopped and starting means rendered inoperative (3) Platform lowered to the full down position, if possible, or otherwise secured by blocking or cribbing to prevent dropping (4) Hydraulic oil pressure relieved from all hydraulic circuits before loosening or removing hydraulic components (5) Safety props or latches installed where applicable as described by the manufacturer.

6.7 Replacement Parts. When parts or components are replaced, they shall be identical or equivalent to original aerial platform parts or components.

6.8 Maintenance Training. The owners shall train their maintenance personnel in inspection and maintenance of the aerial platform in accordance with 6.3, 6.4, 6.5, 6.6, 6.7 and 6.9 of this standard, and with the manufacturer's recommendations.

6.9 Operator Training. An owner who directs or authorizes an individual to operate an aerial platform shall ensure that the individual has been trained in accordance with the manufacturer's operating manual, and requirements listed in Section 8 of this standard before operating the aerial platform.

Manufacturer's operating instruction and required training on the proper use and operation of the aerial platform shall be provided upon each delivery, by sale, lease, or rental.

6.10 Operation. When an owner operates an aerial platform, the owner shall have the responsibilities of users as specified in Section 7 of this standard, and the operating personnel shall have responsibilities of operators as specified in Section 8 of this standard.

6.11 Assistance to Users and Operators. If an owner is unable to answer a user's or operator's questions related to rated capacity, intended use, maintenance, repair, inspection, or operation of the aerial platform, the owner shall obtain the proper information from the dealer or manufacturer and provide that information to user or operator.

6.12 Record Retention. The owner shall retain the following records for at least 3 years: (1) Name and address of the purchaser of each aerial platform by serial number and date of delivery (2) Records of the person(s) trained upon each delivery of an aerial platform (3) Written records of the frequent and annual inspections performed by the owner. The record shall include deficiencies found, corrective action, and identification of the person(s) performing the inspection and repairs (4) Records of the predelivery preparation performed prior to each delivery.

6.13 Modifications. The owner shall not modify or concur in modifications or alteration to the aerial platform without the modifications being approved and certified in writing by the manufacturer.

6.14 Manufacturer's Safety Bulletins. The owner shall comply with safety-related bulletins as received from the manufacturer or dealer.

7. Responsibilities of Users.

7.1 Basic Principles. The information in this standard must be supplemented by good job management, safety control, and the application of sound principles of safety, training, inspection, maintenance, application, and operation consistent with all data available regarding the parameters of intended use and expected environment. Since the user has direct control over the application and operation of aerial platforms, conformance with good safety practices in this area is the responsibility of the user and the operating personnel, including the operator. Decisions on the use and operation of the aerial platform must always be made with due consideration for the fact that the machine will be carrying personnel whose safety is dependent on those decisions.

7.2 Manuals. Users shall keep and maintain copy(ies) of the operating and maintenance manual(s) required in 4.17 of this standard. The operating manual(s) shall be stored in the location required in 4.18 of this standard. These manuals are considered an integral part of the aerial platform and are vital to communication of necessary safety information to users and operators.

7.3 Inspection and Maintenance. Users shall inspect and maintain the aerial platform as required to ensure proper operation. The frequency of inspection and maintenance shall be determined by the manufacturer's recommendation and be compatible with operating conditions and the severity of the operating environment. Aerial platforms that are not in proper operating condition shall be immediately removed from service until repaired. Repairs shall be made by a qualified person and the repairs shall be in conformance with the manufacturer's recommendations.

7.3.1 Frequent Inspection. An inspection as outlined in 6.4 of this standard shall be conducted.

7.3.2 Annual Inspection. An inspection as outlined in 6.5 of this standard shall be conducted.

7.3.3 Prestart Inspection. Before use each day or at the beginning of each shift, the aerial platform shall be given a visual inspection and function test including but not limited to the following: (1) Operating and emergency controls (2) Safety devices (3) Personal protective devices, including fall protection (4) Air, hydraulic and fuel system leaks (5) Cables and wiring harness (6) Loose or missing parts (7) Tires and wheels (8) Placards, warnings, and control markings (9) Outriggers, stabilizers, and other structures (10) Guardrail system (11) Items specified by the manufacturer.

7.3.4 Maintenance Safety Precautions. Before adjustments and repairs are started on an aerial platform, the following precautions shall be taken as applicable: (1) All controls in the "off" position and all operating features secured from inadvertent motion by brakes, blocks, or other means (2) Powerplant stopped and starting means rendered inoperative (3) Platform lowered to the full down position, if possible, or otherwise secured by blocking or cribbing to prevent dropping (4) Hydraulic oil pressure relieved from all hydraulic circuits before loosening or removing hydraulic components (5) Safety props or latches installed where applicable as described by the manufacturer (6) Precautions specified by the manufacturer.

7.4 Replacement Parts. When parts or components are replaced, they shall be identical or equivalent to original aerial platform parts or components.

7.5 Maintenance Training. The user shall train the maintenance personnel in inspection and maintenance of the aerial platform in accordance with 7.3, 7.4, and 7.6 of this standard and with the manufacturer's recommendations.

7.6 Operator Training. Whenever a user directs or authorizes an individual to operate an aerial platform, the user shall ensure that the individual has been trained in accordance with the manufacturer's operation and maintenance manual, the user's work instructions, and the requirements listed in Section 8 of this standard before operating the aerial platform.

7.6.1 Model Training. The user shall be responsible for the operator being trained on the model of the aerial platform to be operated. Such training shall be in an area free of obstructions, under the direction of a qualified person for a time sufficient to determine that the trainee displays proficiency in knowledge and actual operation of the aerial platform. Only properly trained and authorized personnel shall be permitted to operate the aerial platform.

7.6.2 Trainees Training Record. A record of the trainee's aerial platform instruction shall be maintained by the user for at least 3 years.

7.7 Before Operation. Before authorizing an operator to operate an aerial platform, the user shall ensure that the operator has: (1) Been instructed by a qualified person in the intended purpose and function of each control (2) Read and understood the manufacturer's operating instructions and user's safety rules, or been trained by a qualified person on the contents of the manufacturer's operating instructions and user's safety rules (3) Understood by reading or by having a qualified person explain all decals, warnings, and instructions displayed on the aerial platform (4) Determine that the purpose for which the aerial platform is to be used is within the scope of the intended applications defined by the manufacturer (5) Been provided with approved fall protection devices and other safety gear for all personnel on the platform (see 4.9.5).

7.8 Work Place Inspection. Before the aerial platform is used and during use, the user shall check the area in which the aerial platform is to be used for possible hazards such as, but not limited to: (1) Drop-offs or holes (2) Bumps and floor obstructions (3) Debris (4) Overhead obstructions and high voltage conductors (5) Hazardous locations (6) Inadequate surface and support to withstand all load forces imposed by the aerial platform in all operating configurations (7) Wind and weather conditions (8) Other possible unsafe conditions (9) Presence of unauthorized persons.

7.9 During Operation. The aerial platform shall be used in accordance with this standard. The user shall direct the operator to ensure the following before each elevation of the platform: (1) That the aerial platform is operated on a surface within the limits specified by the manufacturer (2) That the outriggers, stabilizers, extendable axles, or other stabilizing methods are used as required by the manufacturer (3) That guardrails are installed and access gates or openings are closed per manufacturer's instructions (4) That the load and its distribution on the platform and any platform extension are in accordance with the manufacturer's rated capacity for that specific configuration (5) That there is adequate clearance from overhead obstructions (6) That the minimum safe approach distances (MSAD) to energized power lines and parts, as listed in Table One are maintained. See Figure 2 for examples of safe operating procedures (7) That the precautions defined in 7.3.3, 7.6, 7.7, 7.8, 7.9, 7.10 and 7.11 of this standard are followed during operation of the aerial platform.

7.10 Determination of Hazardous Locations. It shall be the responsibility of the user to determine the hazard classification of any particular atmosphere or location according to ANSI/NFPA 505-1987. Aerial platforms operated in hazardous locations shall be approved in accordance with, and of the type required, by ANSI/NFPA 505-1987.

7.11 Warnings and Instruction. The user shall direct his operating personnel and supervise the work to ensure operation in compliance with the requirements in 7.11.1 through 7.11.14.

7.11.1 Personnel Footing. Personnel shall maintain a firm footing on the platform floor while working thereon. Use of planks, ladders, or any other device on the aerial platform for achieving additional height or reach shall be prohibited.

7.11.2 Other Moving Equipment. When other moving equipment or vehicles are present, special precautions shall be taken to comply with local ordinances or safety standards established for the workplace. Warnings such as, but not limited to, flags, roped-off areas, flashing lights, and barricades shall be used.

7.11.3 Reporting Problems or Malfunctions. The operator shall immediately report to the supervisor any problems or malfunctions that become evident during operation. Any problems or malfunctions that affect the safety or operations shall be repaired prior to continued use of the aerial platform.

7.11.4 Altering Safety Devices. Altering or disabling of interlocks or other safety devices shall be prohibited.

7.11.5 Entanglement. Care shall be taken to prevent rope, electric cords, hoses, etc., from becoming entangled in the aerial platform.

7.11.6 Capacity Limitation. Aerial platform rated capacities shall not be exceeded when loads are transferred to the platform at any height.

7.11.7 Work Area. The operator shall ensure that the area surrounding the aerial platform is clear of personnel and equipment before lowering the platform.
7.11.8 Fueling. The engine shall be shut down while fuel tanks are being filled. Fueling shall be done in a well-ventilated area free of flame, sparks, or other hazards that may cause fire or explosion.
7.11.9 Battery Charging. Batteries shall be charged in a well-ventilated area free of flame, sparks, or other hazards that may cause fire or explosion.
7.11.10 Platform Positioning. The aerial platform shall not be positioned against another object to steady the platform.
7.11.11 Misuse as a Crane. The aerial platform shall not be used as a crane.
7.11.12 Operating Areas. The aerial platform shall not be operated from a position on trucks, trailers, railway cars, floating vessels, scaffolds, or similar equipment, unless the application is approved in writing by the manufacturer.
7.11.13 Travel Conditions. Under all travel conditions, the operator shall limit travel speed according to conditions of ground surface, congestion, visibility, slope, locations of personnel, and other factors causing hazards of collision or injury to personnel.
7.11.14 Unauthorized Use. Means shall be used to protect against use by unauthorized person(s).

7.12 Operation of the Aerial Platform. If a user is also the operator of an aerial platform, the user shall have the responsibilities of operators specified in Section 8 of this standard as well as responsibilities of users as specified in Section 7 of this standard.

7.13 Assistance to Operator. If a user is unable to answer any operator's questions relating to rated capacity, intended use, maintenance, condition, or safety of operation of the aerial platform, the user shall obtain the proper information from the dealer, owner, or manufacturer and provide that information to the operator before use of the aerial platform in the application of concern.

7.14 Shutdown of Aerial Platform. The user shall authorize and direct the operating personnel to cease operation of the aerial platform in case of any suspected malfunctions of the aerial platform, or any hazard or potentially unsafe condition that may be encountered, and to request further information as to safe operation from the owner, dealer, or manufacturer before further operation of the aerial platform.

7.15 Record Retention. The user shall retain the following records for at least 3 years: (1) Records of the operator(s) trained on each model of an aerial platform (2) Written records of the frequent and annual inspections shall be kept by the user when performing the inspections. The records shall include the date of inspection, any deficiencies found, the corrective action recommended and identification of the person(s) performing the inspection (3) Written records of all repairs accomplished on the aerial platform, including the date of any such repair, a description of the work accomplished, and the identification of the person(s) performing the repair.

7.16 Modifications. A user shall not modify or concur in modification of an aerial platform without the specific written approval of the manufacturer of the aerial platform.

7.17 Manufacturer's Safety Bulletins. The user shall comply with safety-related bulletins as received from the manufacturer, dealer, or owner.

8. Responsibilities of Operators

8.1 Basic Principles. The information in this standard shall be supplemented by good judgment, safety control, and caution in evaluating each situation. Since the operator is in direct control of the aerial platform, conformance with good safety practices in this area is the responsibility of the operator. The operator shall make decisions on the use and operation of the aerial platform with due consideration for the fact that his or her own safety as well as the safety of other personnel on the platform is dependent on those decisions.

8.2 Manuals. The operator shall be aware that the operating safety manuals, including the manual that defines the responsibilities of dealers, owners, lessors, lessees, users, and operators are stored on the aerial platform and the location where they are stored. The operator shall be familiar with the manuals stored on the aerial platform and consult them when questions arise with respect to the aerial platform.

8.3 Prestart Inspection. Before use each day or at the beginning of each shift, the aerial platform shall be given a visual inspection and functional test including but not limited to the following: (1) Operating and emergency controls (2) Safety devices (3) Personal protective devices, including fall protection (4) Air, hydraulic, and fuel system leaks (5) Cables and wiring harness (6) Loose or missing parts (7) Tires and wheels (8) Placards, warnings, and control markings (9) Outriggers, stabilizers, and other structures (10) Guardrail system (11) Items specified by the manufacturer.

8.4 Problems or Malfunctions. Any problems or malfunctions that affect the safety of operations shall be repaired prior to the use of the aerial platform.

8.5 Training. The operator shall have been trained either on the same model of aerial platform or one having operating characteristics and controls consistent with the one to be used during actual work site operation. The operator trainee shall operate the aerial platform in an area free of obstructions under the direction of the qualified person for a time sufficient to determine that the trainee displays proficiency in knowledge and actual operation of the aerial platform. Only properly trained and authorized personnel shall be permitted to operate the aerial platform.

8.6 Before Operation. Before being authorized to operate the aerial platform, the operator shall have: (1) Been instructed by a qualified person in the intended purpose and function of each of the controls (2) Read and understood the manufacturer's/owner's operating instructions and safety rules, or been trained by a qualified person on the contents of the manufacturer's/owner's operating instructions and safety rules (3) Understood by reading or by having a qualified person explain all decals, warnings, and instructions displayed on the aerial platform.

8.7 Workplace Inspection. Before the aerial platform is used and during use, the operator shall check the area in which the aerial platform is to be used for possible hazards such as, but not limited to: (1) Drop-offs or holes (2) Bumps and floor obstructions (3) Debris (4) Overhead obstructions and high voltage conductors (5) Hazardous locations (6) Inadequate surface and support to withstand all load forces imposed by the aerial platform in all operating configurations (7) Wind and weather conditions (8) Other possible unsafe conditions.

8.8 During Operation. The aerial platform shall be used in accordance with this standard. The operator shall ensure the following before each elevation of the platform: (1) That the aerial platform is operated on a surface within the limits specified by the manufacturer (2) That the outriggers, stabilizers, extendable axles, or other stability enhancing means are used as required by the manufacturer (3) That the guardrails are installed and access gates or openings are closed per manufacturer's instructions (4) That the load and its distribution on the platform and any platform extensions are in accordance with the manufacturer's rated capacity for that specific configuration (5) That there is adequate clearance from overhead obstructions (6) That the minimum safe approach distances (MSAD) to energized power lines and parts, as listed in Table One, are maintained. See Figure 2 for examples of safe operating procedures (7) That he or she and all other personnel on the platform are wearing fall protection devices and other safety gear as required at all times (see 4.9.5).

8.9 Determination of Hazardous Locations. It shall be the responsibility of the user to determine the hazard classification of any particular atmosphere or location according to ANSI/NFPA 505.

8.9.1 Hazardous Location Operating Requirements. Aerial platforms operated in hazardous locations shall be approved and of the type required by ANSI/NFPA 505.

8.10 Warnings and Instructions. The operator and other personnel on the platform shall comply with the requirements in 8.10.1 through 8.10.17.

8.10.1 Personnel Footing. Personnel shall maintain a firm footing on the platform floor while working thereon. Use of planks, ladders, or any other devices on the aerial platform for achieving additional height or reach shall be prohibited.

8.10.2 Other Moving Equipment. When other moving equipment or vehicles are present, special precautions shall be taken to comply with local ordinances or safety standards established for the workplace. Warnings such as, but not limited to, flags, roped off areas, flashing lights, and barricades shall be used.

8.10.3 Reporting Problems or Malfunctions. The operator shall immediately report to a supervisor any problems or malfunctions that become evident during operation. Any problems or malfunctions that affect the safety of operation shall be repaired prior to continued use of the aerial platform.

8.10.4 Reporting Potential Hazardous Locations. The operator shall immediately report to a supervisor any potential hazardous locations (environment) that become evident during operation.

8.10.5 Altering Safety Devices. Altering or disabling of interlocks or other safety devices shall be prohibited.

8.10.6 Entanglement. Care shall be taken to prevent rope, electric cords, hoses, etc., from becoming entangled in the aerial platform.

8.10.7 Capacity Limitation. Aerial-platform rated capacities shall not be exceeded when loads are transferred to the platform at any heights

8.10.8 Work Area. The operator shall ensure that the area surrounding the aerial platform is clear of personnel and equipment before lowering the platform.

8.10.9 Fueling. The engine shall be shut down while fuel tanks are being filled. Fueling shall be done in a well-ventilated area free of flame, sparks, or other hazards that may cause fire or explosion.

8.10.10 Battery Charging. Batteries shall be charged in a well-ventilated area free of flame, sparks, or other hazards that may cause fire or explosion.

8.10.11 Platform Positioning. The aerial platform shall not be positioned against another object to steady the platform.

8.10.12 Misuse as a Crane. The aerial platform shall not be used as a crane.

8.10.13 Operating Areas. The aerial platform shall not be operated from a position on trucks, trailers, railway cars, floating vessels, scaffolds, or similar equipment, unless the application is approved in writing by the manufacturer.

8.10.14 Travel Conditions. Under all travel conditions, the operator shall limit travel speed according to conditions of ground surface, congestion, visibility, slope, location of personnel, and other factors causing hazards of collision or injury to personnel.

8.10.15 Unauthorized Use. Means shall be used to protect against use by unauthorized person(s).

8.10.16 Misuse as a Jack. The platform of the aerial platform shall not be used to jack the wheels off the ground unless the machine is designed for that purpose by the manufacturer.

8.10.17 Snagged Platform. If the platform or elevating assembly becomes caught, snagged, or otherwise prevented from normal motion by adjacent structure or other obstacles such that control reversal does not free the platform, all personnel shall be removed from the platform before attempts are made to free the platform using ground controls.

8.11 Assistance to Operator. If an operator encounters any suspected malfunction of the aerial platform, or any hazard or potentially unsafe condition relating to capacity, the operator shall cease operation of the aerial platform and request further information as to safe operation from management, or from the owner, dealer, or manufacturer, before further operation of the aerial platform.

8.12 Modifications. An operator shall not modify or concur in modification of an aerial platform without the specific written approval of the manufacturer of the aerial platform.

9. Responsibilities of Lessors

9.1 Basic Principles. Sound principles of safety, training, inspection, maintenance, application, and operation consistent with all data available regarding the parameters of intended use and expected environment shall be applied in the performance of responsibilities of lessors with due consideration of the knowledge that the unit shall be carrying personnel.

9.2 Lessor. A lessor is a person(s) or entity who leases, rents, loans, or otherwise provides an aerial platform to another party for the beneficial use of that party (the user). A lessor may also be a dealer, owner, lessee, user, or operator.

9.2.1 Lessor as a Dealer. When a lessor uses the aerial platform as a dealer, the lessor shall have the responsibilities of dealers as specified in Section 5 of this standard.

9.2.2 Lessor as an Owner. When a lessor uses the aerial platform as an owner, the lessor shall have responsibilities of owners as specified in Section 6 of this standard.

9.2.3 Lessor as a User. When a lessor uses the aerial platform as a user, the lessor shall have the responsibilities of operators as specified in Section 8 of this standard.

10. Responsibilities of Lessees

10.1 Basic Principles. Sound principles of safety, training, inspection, maintenance, application, and operation consistent with all data available regarding the parameters of intended use, and expected environment, shall be applied in the performance of responsibilities of lessees with due consideration of the knowledge that the aerial platform carries personnel.

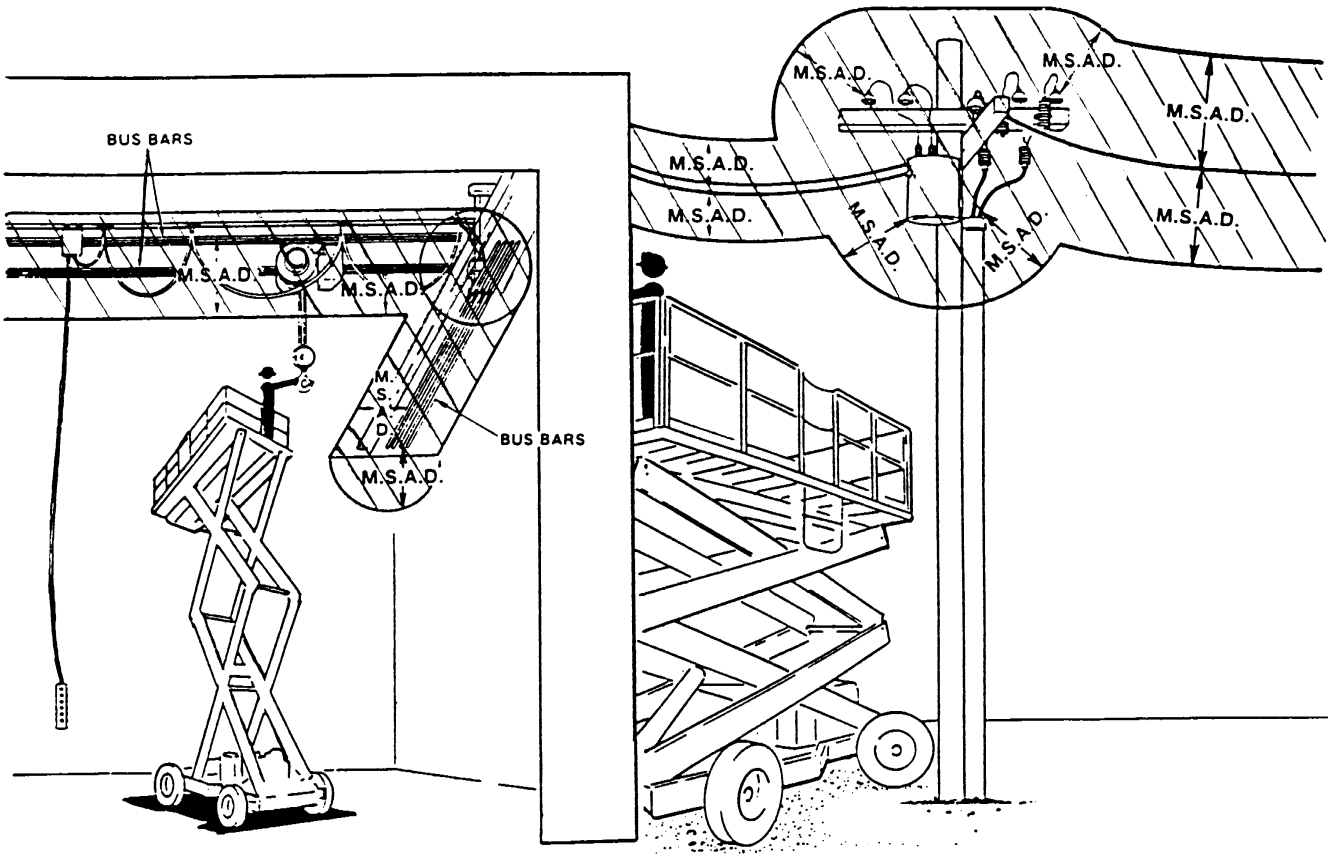
10.2 Lessee. A lessee is a person(s) or entity to whom an aerial platform is provided by lease, rental, loan, or other arrangement. A lessee may also be a user or operator.

10.2.1 Lessee as a Dealer. When a lessee uses the aerial platform as a dealer, the lessee shall have the responsibilities of dealers as specified in Section 5 of this standard.

10.2.2 Lessee as an Owner. When a lessee uses the aerial platform as an owner, the lessee shall have the responsibilities of owners as specified in Section 6 of this standard.

10.2.3 Lessee as a User. When a lessee uses the aerial platform as a user, the lessee shall have the responsibilities of users as specified in Section 7 of this standard.

10.2.4 Lessee as an Operator. When a lessee uses the aerial platform as an operator, the lessee shall have the responsibilities of operators as specified in Section 8 of this standard.



M.S.A.D. = Minimum Safe Approach Distance (See Table 7-1).

DENOTES PROHIBITED ZONE

DANGER

- **Do not allow machine, personnel, or conductive materials inside prohibited zone.**
- **Maintain M.S.A.D. from all energized lines and parts as well as those shown.**
- **Assume all electrical parts and wires are energized unless known otherwise.**

CAUTION

Diagrams shown are only for purposes of illustrating M.S.A.D. work positions, not all work positions.

Table 7-1. Minimum Safe Approach Distance (M.S.A.D.) to energized (exposed or insulated) power lines and parts.

Voltage Range (Phase to Phase)	Minimum Safe Approach Distance	
	(Feet)	(Meters)
0 to 300V	Avoid Contact	
Over 300V to 50KV	10	3.05
Over 50KV to 200KV	15	4.60
Over 200KV to 350KV	20	6.10
Over 350KV to 500KV	25	7.62
Over 500KV to 750KV	35	10.67
Over 750KV to 1000KV	45	13.72

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